

# Survey Results & Analysis

for

## Software Reuse Questionnaire 2

Account: seeds

Monday, July 25, 2005 2:17:42 PM

Vista™ Survey System

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# Introduction

This report contains a detailed statistical analysis of the results to your survey named *Software Reuse Questionnaire 2*. The results analysis includes answers from all respondents who took your survey in the 146 day period from Wednesday, March 02, 2005 to Monday, July 25, 2005 inclusive.

## Report Contents

This report is divided into four sections:

1. Introduction
2. Results Analysis
3. Questionnaire
4. Notes

The **Introduction** (this section) contains an overview of the report structure.

The **Results Analysis** section contains a summary and statistical analysis of the results to each question in your survey.

The **Questionnaire** section lists all questions in your survey's questionnaire. This is provided as a reference to help you interpret the Results Analysis.

The **Notes** sections contains definitions of key terms and tips on how to interpret your results.

## Confidence Intervals

Wherever possible, results are presented with an indication of the results accuracy. Usually this is presented in the form of a confidence interval. It is important when reviewing survey results to make sure that any action you plan is based only on statistically significant results.

## Correlation Analysis

In preparing the results analysis, the report generator has examined all questions in pairs to see if there are any correlations between answers. Whenever a significant correlation is found, it is noted. This information can be valuable in determining what demographic or experience characteristics tend to drive key measures such as overall satisfaction.

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# Results Analysis

**Survey name:** Software Reuse Questionnaire 2  
**Start date:** Wednesday, March 02, 2005  
**End date:** Monday, July 25, 2005  
**Number of respondents:** 100

**Filter:**

Include all respondent's answers.

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i)

## Earth Science Software Reuse Questionnaire

This software reuse questionnaire is being conducted by the NASA Earth Science Data Systems Software Reuse Working Group to (1) learn about the Earth science community's needs for reusable software components (and other software development artifacts), (2) identify software artifacts that are already being reused within the community, and (3) identify existing patterns of software reuse.

Your participation in this survey is appreciated as it will help us to better understand the reuse needs of the Earth science community and to propose solutions that can best fit those needs. Such solutions will enable members of the community to more easily share, publish and locate reusable components of interest. By facilitating reuse within the Earth science community, the working group is seeking to help you reduce system development costs, gain greater visibility for your work within the community, and more efficiently share resources across projects.

On average, the questionnaire takes about 20 minutes to complete. In addition to submitting your own response, it would be valuable to the reuse working group if you can also forward the questionnaire to other members of your development team who are involved in system architecture and/or influence decisions on selection of system components.

The information collected here will only be used by the reuse working group for the purposes described above. Individual responses will not be distributed to other entities without prior approval from respondents. Results will only be published in aggregate form and will be made available at <http://softwarereuse.nasa.gov/>

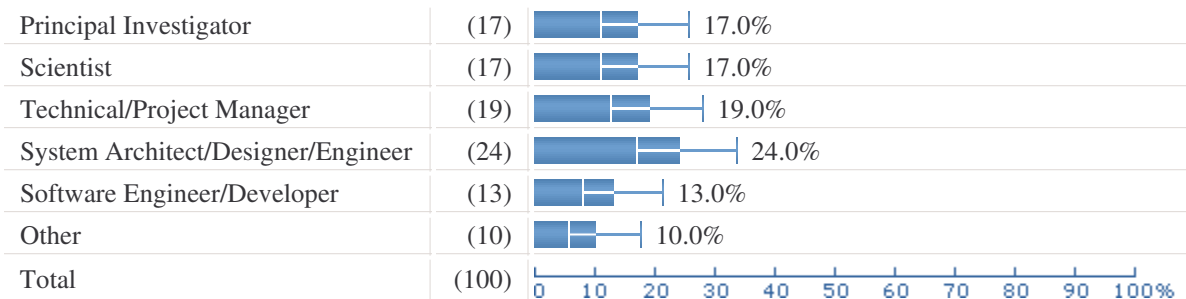
The NASA Earth Science Data Systems Software Reuse Working Group is chartered to address technical issues required to enable and facilitate reuse of software assets within the Earth science community. The working group is comprised of part time support staff from NASA, Earth science mission projects, Earth science data providers and university researchers. More information about the activities of the working group can be found at <http://softwarereuse.nasa.gov/>. You can subscribe to our mailing list at [here](#).

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ii) **Background Information**

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1) Which of the following best describes your main role in your project/software development process? (Select one)



Confidence: +/-8.4%

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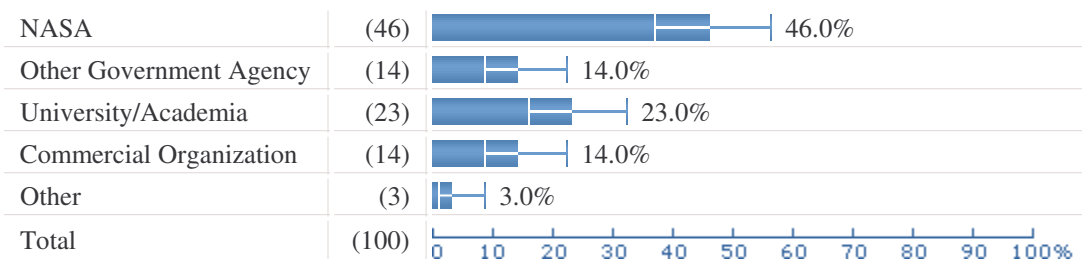
1a) If Other, please specify:

*Answers not displayed.*

An answer to this question is not required and 90 of 100 respondents chose not to answer.

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2) Which category best describes the type of your organization? (Select one)



Confidence: +/-9.7%

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2a) If Other or Other Government Agency, please specify:

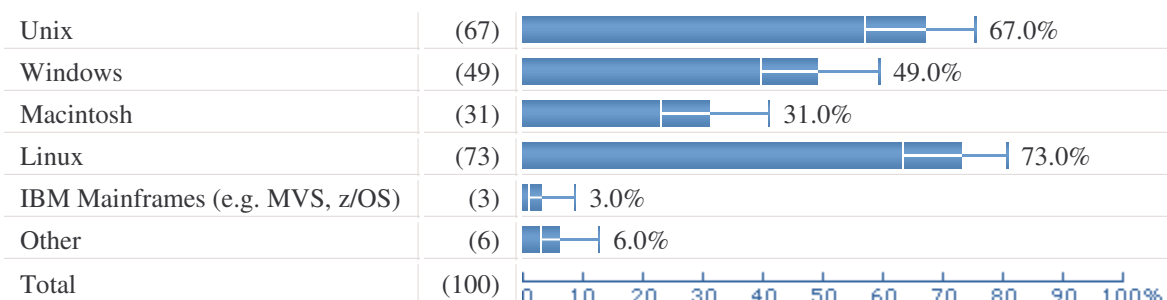
*Answers not displayed.*

An answer to this question is not required and 89 of 100 respondents chose not to answer.

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3) Which Operating System(s) do you currently use or plan to use in the future for your system development

activities? (check all appropriate boxes)



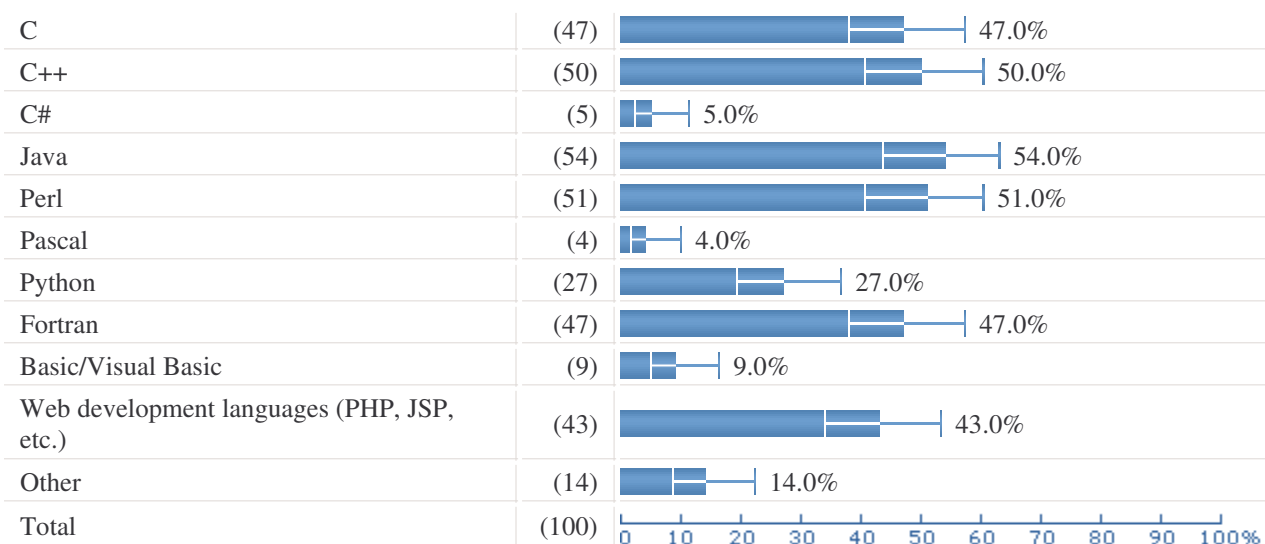
Confidence: +/-9.7%

3a) If Other, please specify:

*Answers not displayed.*

An answer to this question is not required and 93 of 100 respondents chose not to answer.

4) Which programming language(s) do you currently use or plan to use in the future for your system development activities? (check all appropriate boxes)



Confidence: +/-9.7%

4a) If Other, please specify:

Answers not displayed.

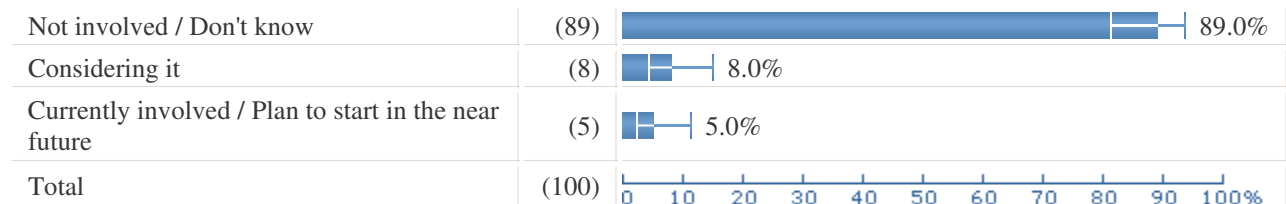
An answer to this question is not required and 81 of 100 respondents chose not to answer.

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5) Is your organization involved in activities that involve using either of the following:

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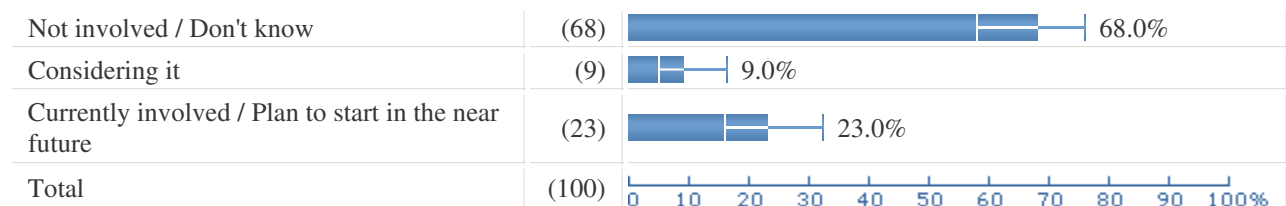
5a) Federal Enterprise Architecture



Confidence: +/-6.2%

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5b) CMMI



Confidence: +/-9.1%

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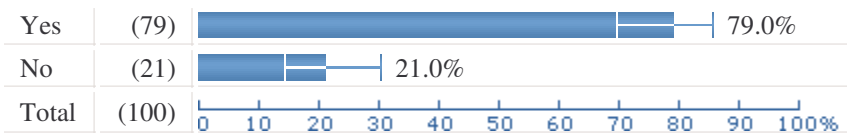
iii)

### Recent Reuse Experiences

**Definition of Reuse:** Within the context of this survey, reuse is defined as the process of creating systems using software development artifacts from existing systems, rather than building everything from scratch. Most reuse involves software source code but other types of software development artifacts (such as design patterns, algorithms, and executable components) can also be reused.

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6) Over the last five years, have you reused software development artifacts developed outside of your project or group?



Confidence: +/-8.0%

Answers to this question are correlated with how respondents answered the following questions:

**Correlation Question**

-0.31 Q53) May our researcher contact you if we need to clarify any of your responses?.

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iv) Go to question viii if question 6 is Yes

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v) Go to question vi if question 6 is No

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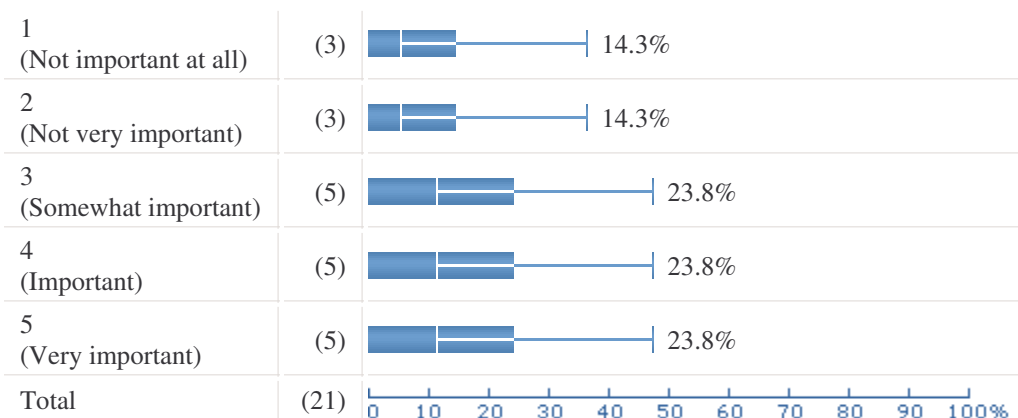
vi) **Recent Reuse Experiences**

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7) **How important were the following factors in preventing you from reusing software development artifacts developed outside of your group?**

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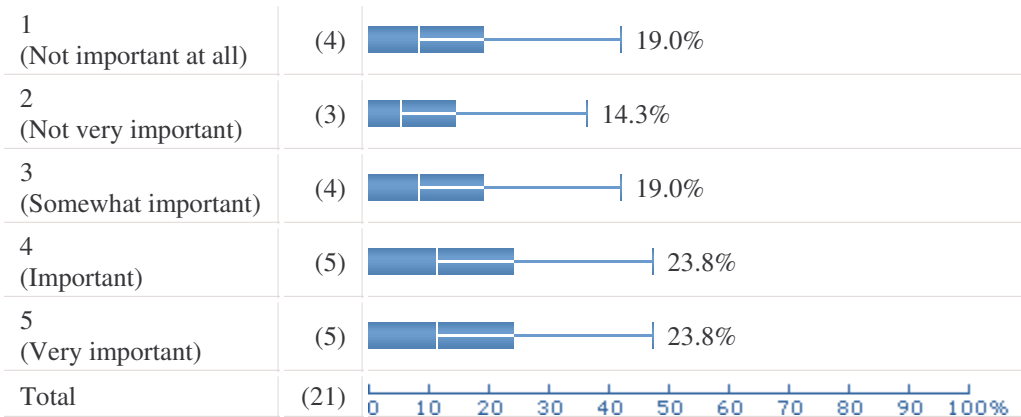
7a) a) I didn't know where to look for reusable artifacts



Confidence: +/-17.9%

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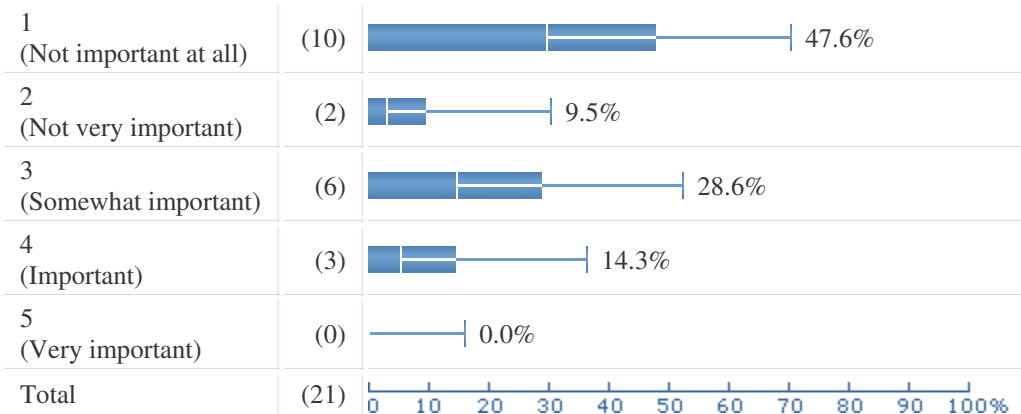
7b) b) I didn't know that suitable reusable artifacts existed at the time



Confidence: +/-17.9%

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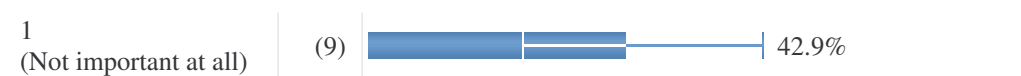
7c) c) I couldn't find anything that is compatible with my system



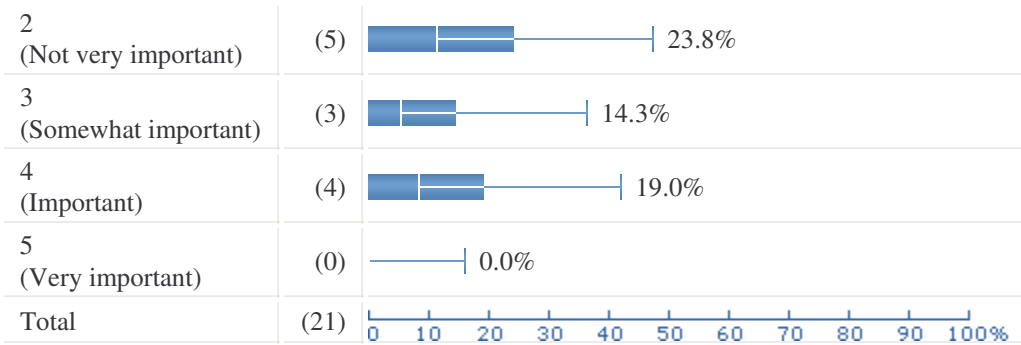
Confidence: +/-20.2%

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7d) d) Available artifacts were too complex or difficult to adapt to my needs



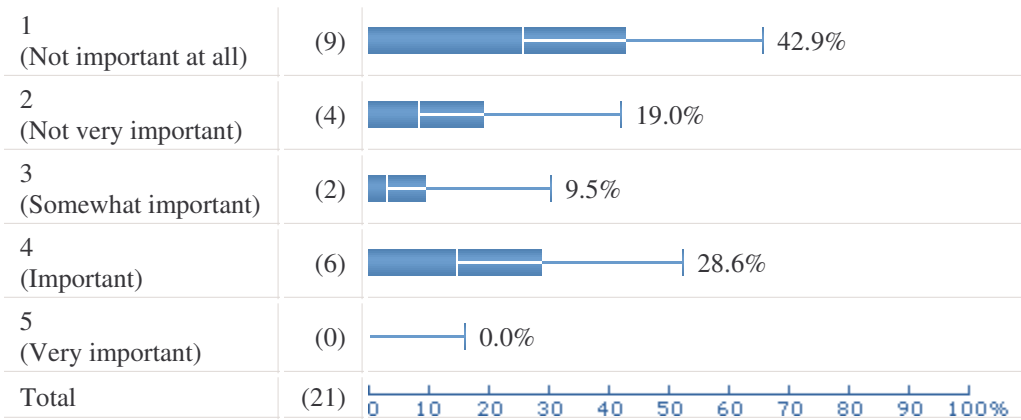




Confidence: +/-20.1%

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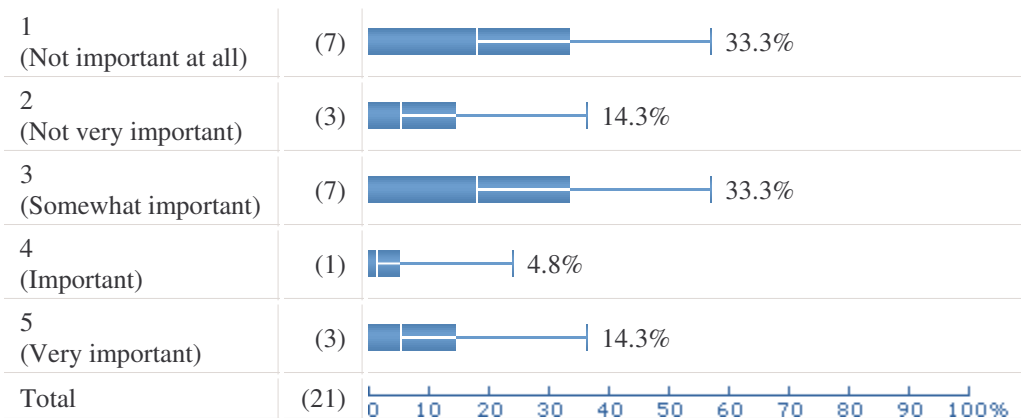
7e) e) Available artifacts were difficult to understand or poorly documented



Confidence: +/-20.1%

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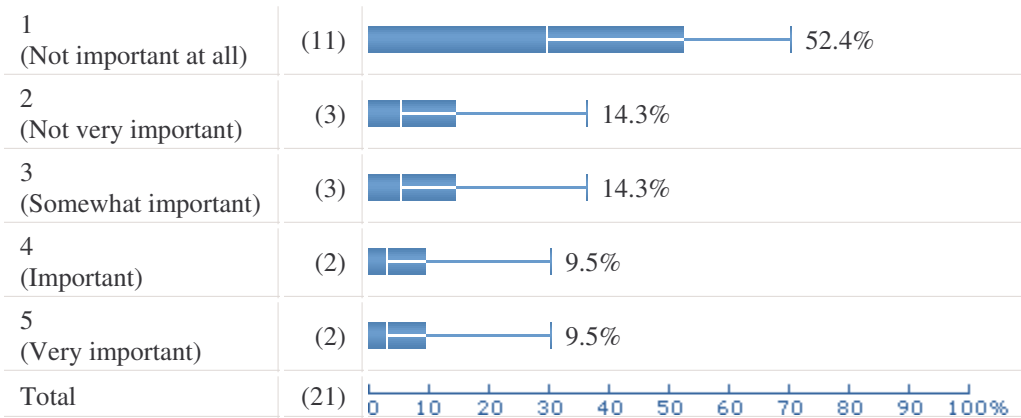
7f) f) None of the available artifacts matched my requirements



Confidence: +/-19.4%

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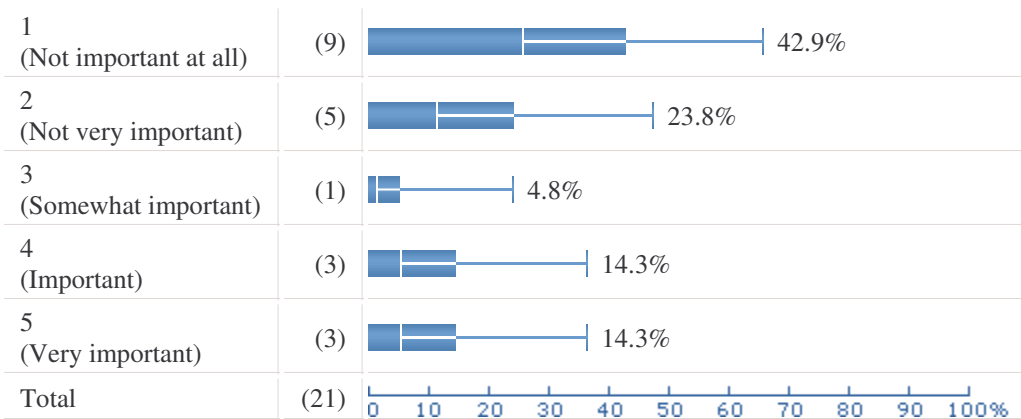
7g) g) It was hard to overcome licensing restrictions



Confidence: +/-20.2%

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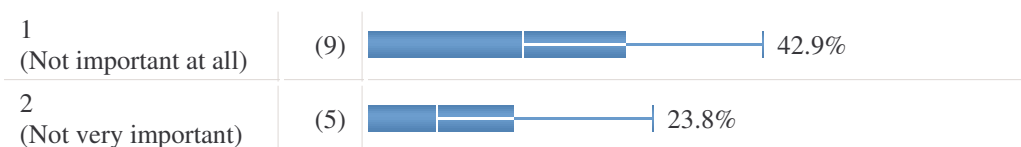
7h) h) I needed the source code and it wasn't available

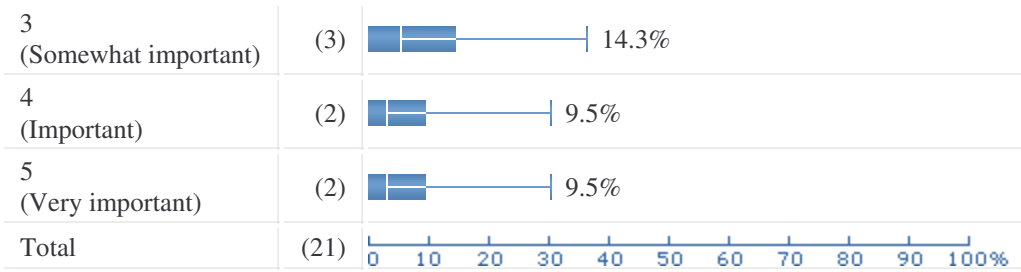


Confidence: +/-20.1%

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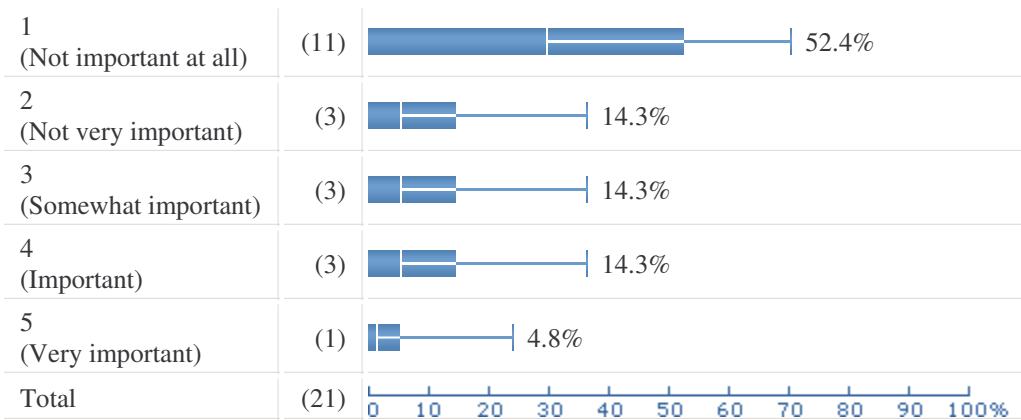
7i) i) I preferred to have the development take place within my project or wanted the experience of developing the needed capability





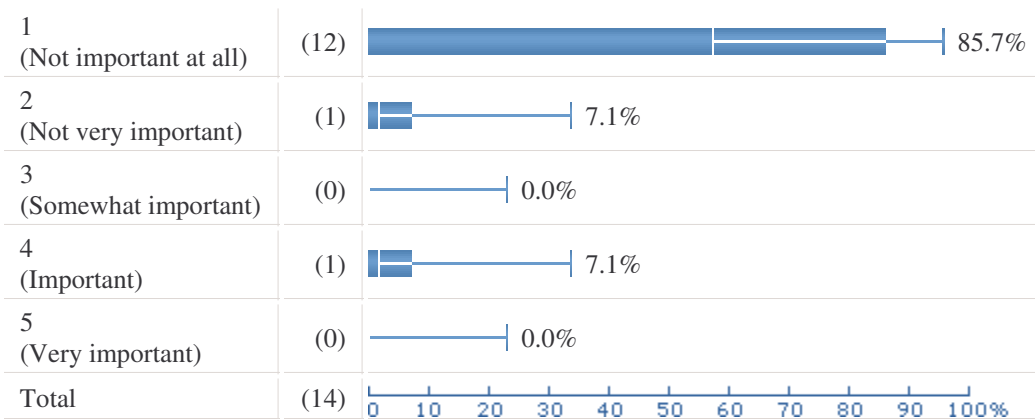
Confidence: +/-20.1%

7j) j) I didn't like how the other software was designed/implemented



Confidence: +/-20.2%

7k) k) Other



Confidence: +/-19.1%

An answer to this question is not required and 7 of 21 respondents chose not to answer.

8) If Other, please specify what prevented you from reusing software development artifacts developed outside of your group:

Answers not displayed.

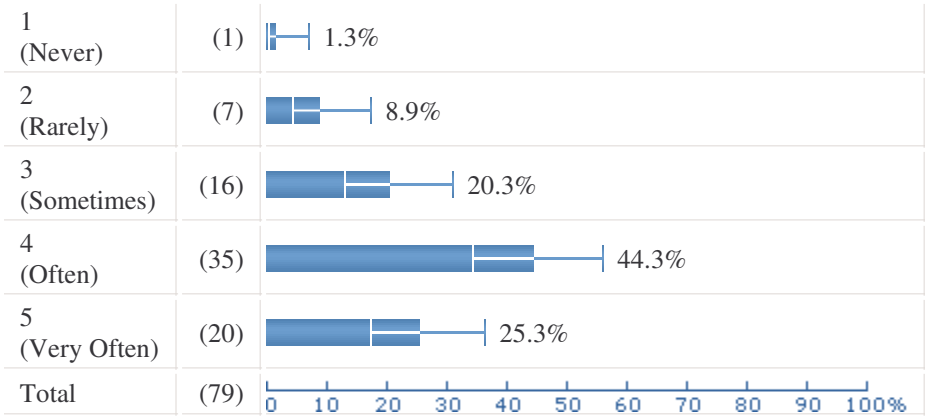
An answer to this question is not required and 16 of 21 respondents chose not to answer.

vii) Go to question xix if question 6 is No

viii) **Recent Reuse Experiences**

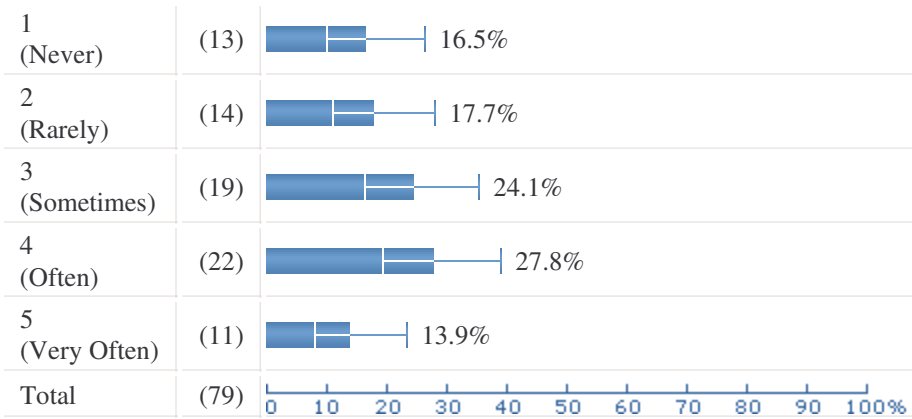
9) **Over the last five years, how often have you (or your project) reused the following types of software development artifacts?**

9a) a) Algorithms, Techniques



Confidence: +/-10.8%

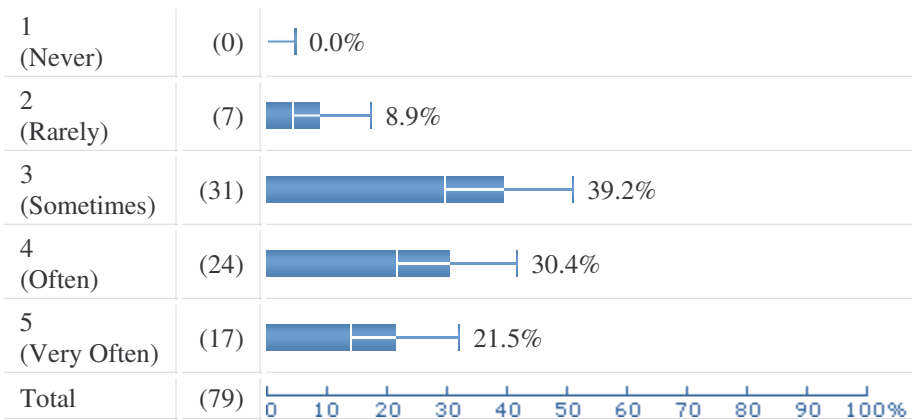
9b) b) Designs, Architectures



Confidence: +/-9.8%

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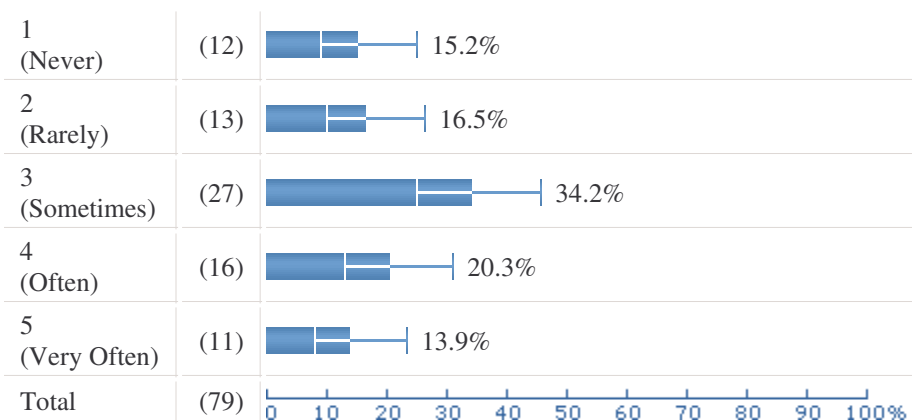
9c) c) Source code, Scripts



Confidence: +/-10.6%

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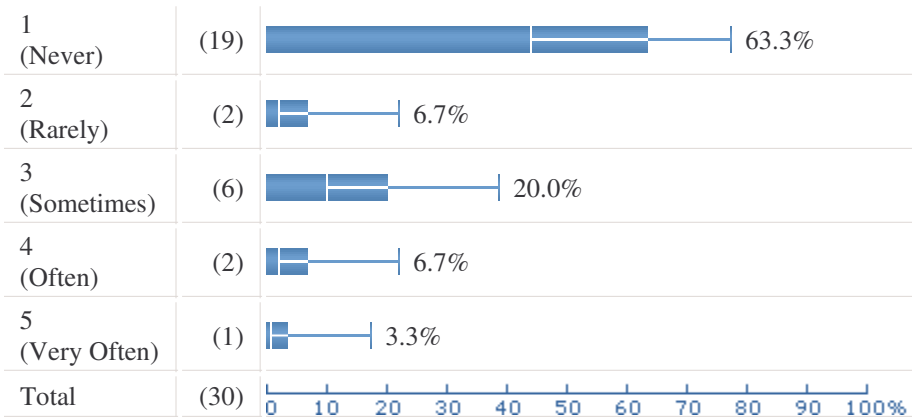
9d) d) Executables, Binaries



Confidence: +/-10.4%

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9e) e) Other



Confidence: +/-16.7%

An answer to this question is not required and 49 of 79 respondents chose not to answer.

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10) If Other, please specify what other types of software development artifacts you have reused in the last five years:

*Answers not displayed.*

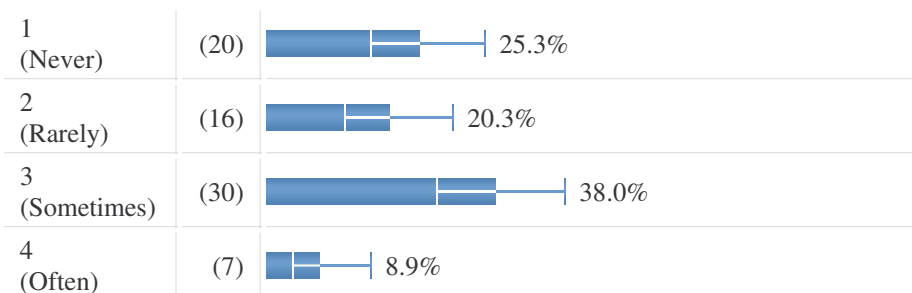
An answer to this question is not required and 74 of 79 respondents chose not to answer.

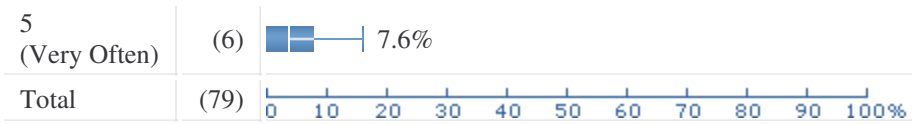
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11) Over the last five years, how often have you (or your project) reused the following types of software?

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11a) a) Complete systems or applications

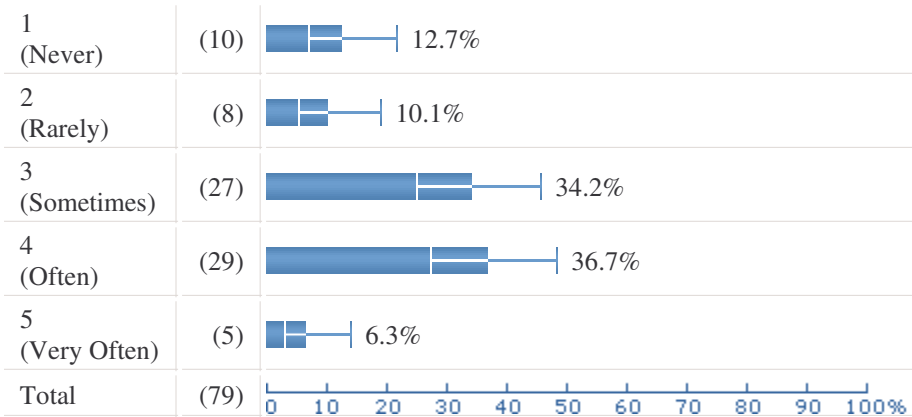




Confidence: +/-10.6%

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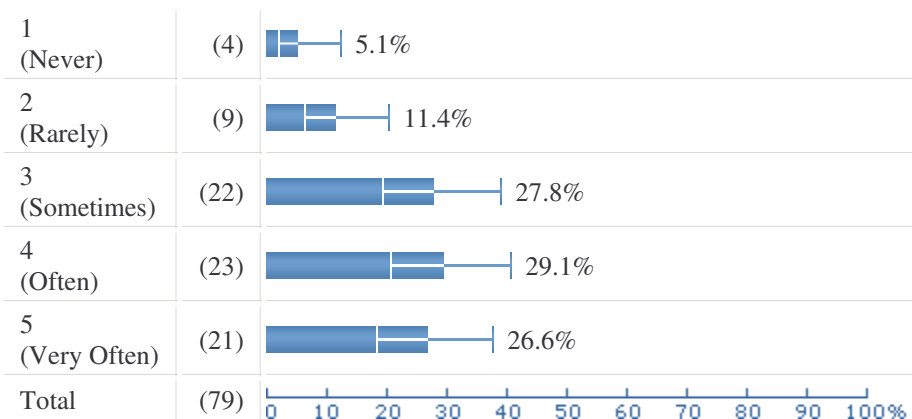
#### 11b) b) Subsystems or components



Confidence: +/-10.5%

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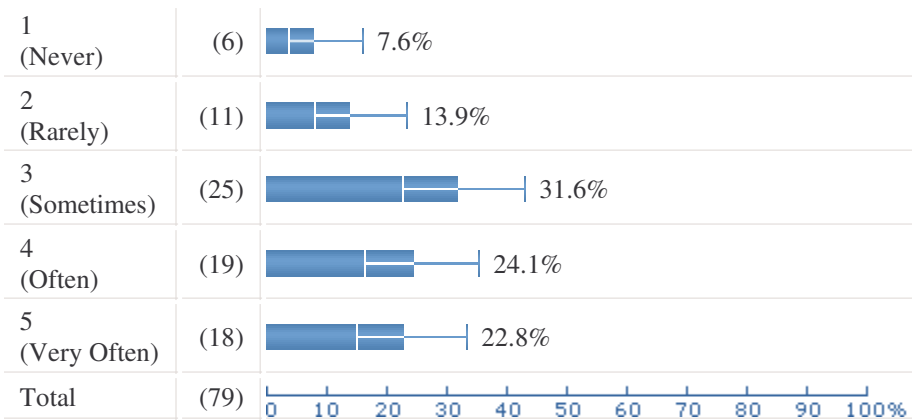
#### 11c) c) Code libraries



Confidence: +/-9.9%

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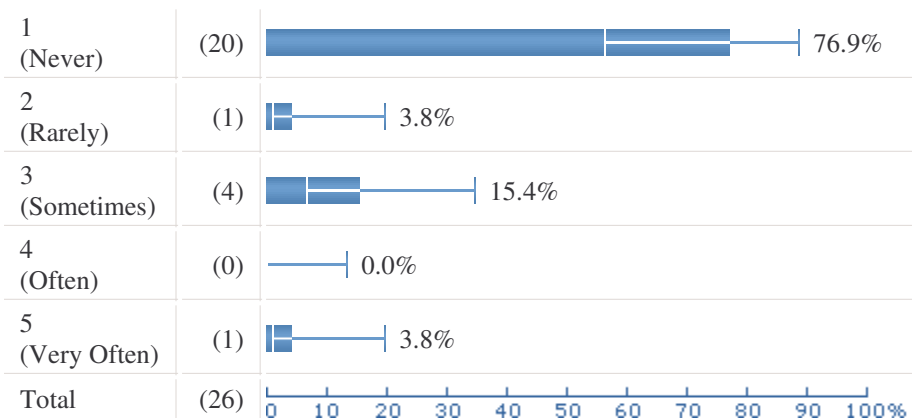
#### 11d) d) Code fragments



Confidence: +/-10.2%

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11e) e) Other



Confidence: +/-16.0%

An answer to this question is not required and 53 of 79 respondents chose not to answer.

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12) If Other, please specify what other types of software you have reused in the last five years:

*Answers not displayed.*

An answer to this question is not required and 79 of 79 respondents chose not to answer.

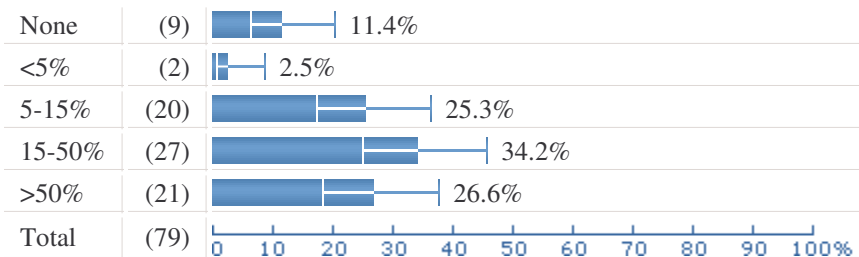
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ix) **Recent Reuse Experiences**



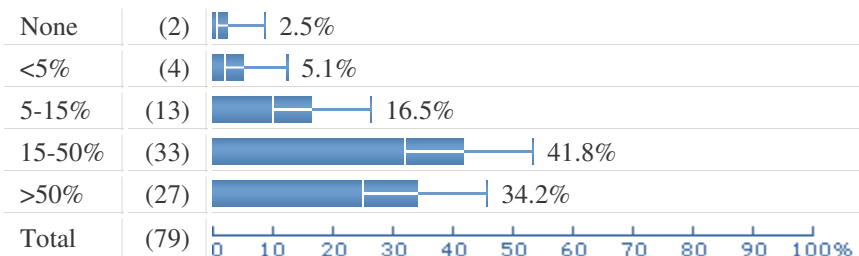
13) In your most recent software development experience, approximately what percentage of functionality was provided by each of the following (this is for your system only and excludes systems or services that your system interacts with)?

13a) a) Existing software in the baseline system



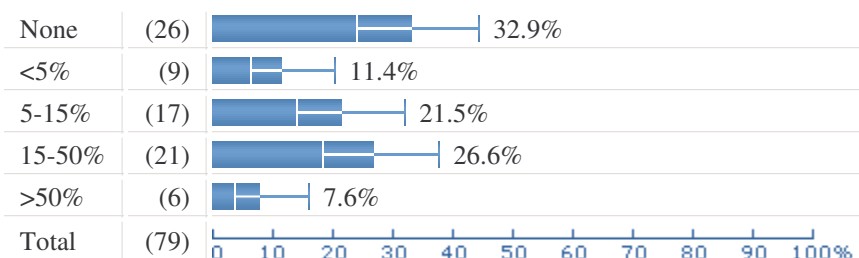
Confidence: +/-10.4%

13b) b) Newly written custom software



Confidence: +/-10.7%

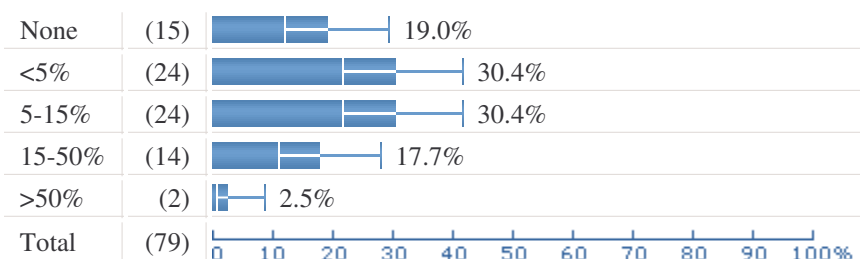
13c) c) Software reused from another part of your organization



Confidence: +/-10.3%

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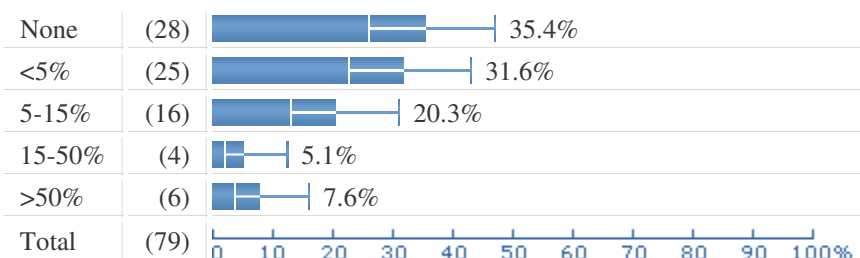
13d) d) Software reused from another organization in the Earth science community



Confidence: +/-10.1%

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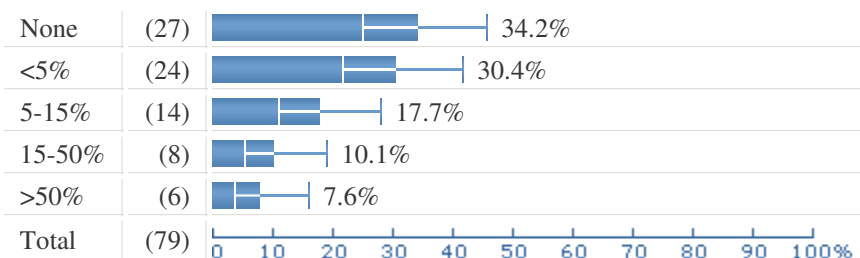
13e) e) Software reused from outside the Earth science community



Confidence: +/-10.4%

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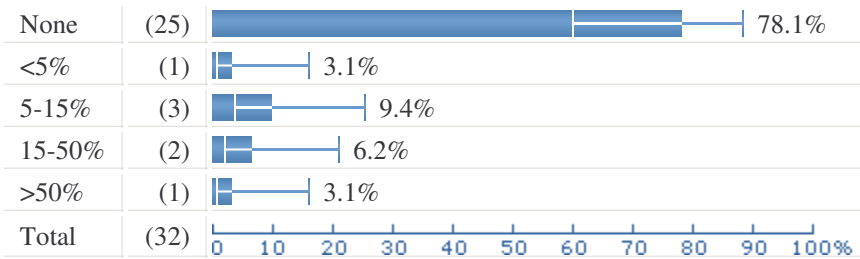
13f) f) Commercial components



Confidence: +/-10.4%

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13g) g) Other



Confidence: +/-14.3%

An answer to this question is not required and 47 of 79 respondents chose not to answer.

- 
- 14) If Other, please specify the other sources of software that you've used in your most recent software development project:

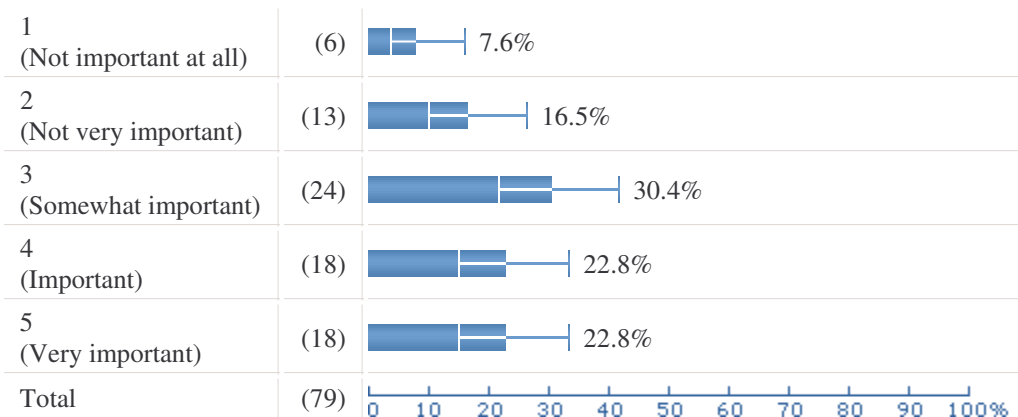
*Answers not displayed.*

An answer to this question is not required and 75 of 79 respondents chose not to answer.

- 
- 15) If you've indicated that you've reused software from outside of your project group, how important were the following factors in your decision to consider reuse?

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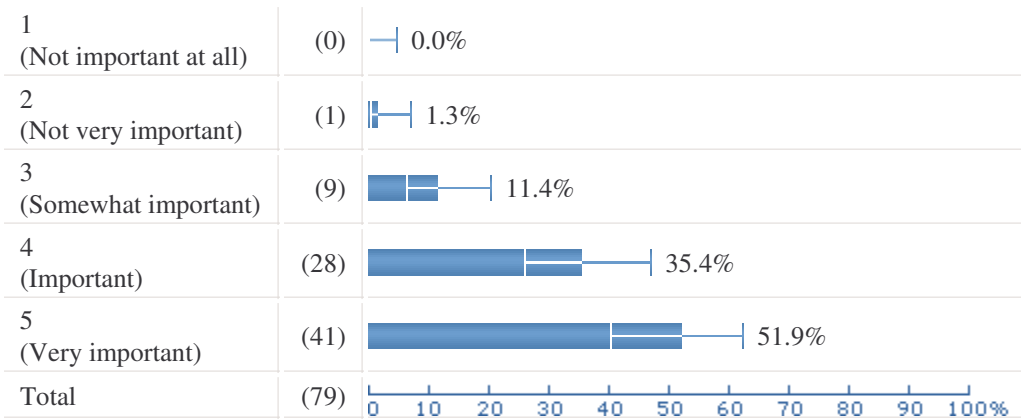
15a) a) Saving money



Confidence: +/-10.1%

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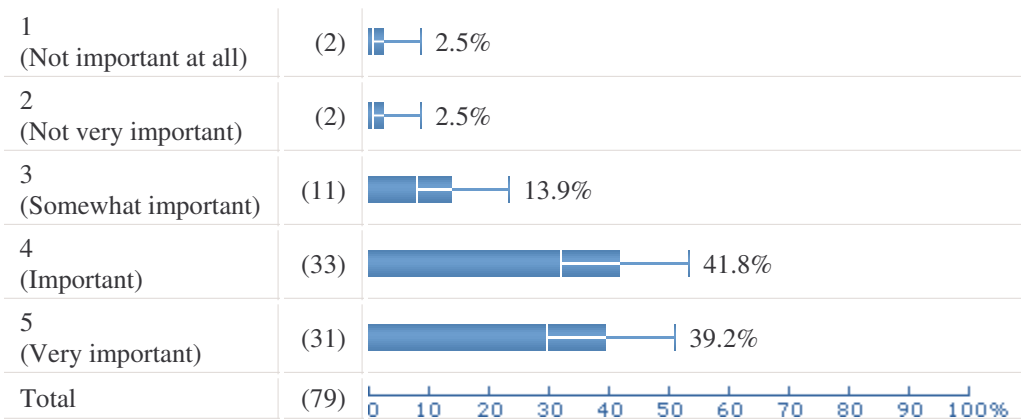
15b) b) Saving time



Confidence: +/-10.9%

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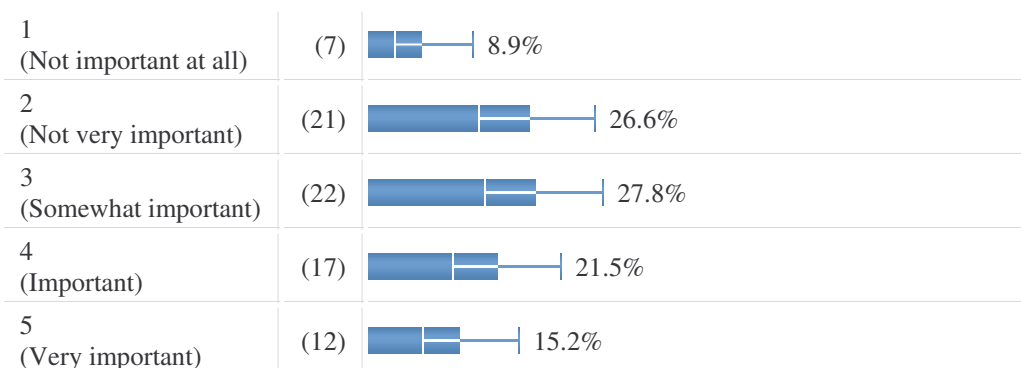
15c) c) Ensuring reliability



Confidence: +/-10.7%

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15d) d) Not having the needed expertise in my organization



Total	(79)	
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Confidence: +/-9.8%

15e) e) Other

1 (Not important at all)	(20)	 76.9%
2 (Not very important)	(1)	 3.8%
3 (Somewhat important)	(0)	 0.0%
4 (Important)	(2)	 7.7%
5 (Very important)	(3)	 11.5%
Total	(26)	

Confidence: +/-16.0%

An answer to this question is not required and 53 of 79 respondents chose not to answer.

16) If Other, please specify how you provided the specified percentage of functionality in your most recent software development project:

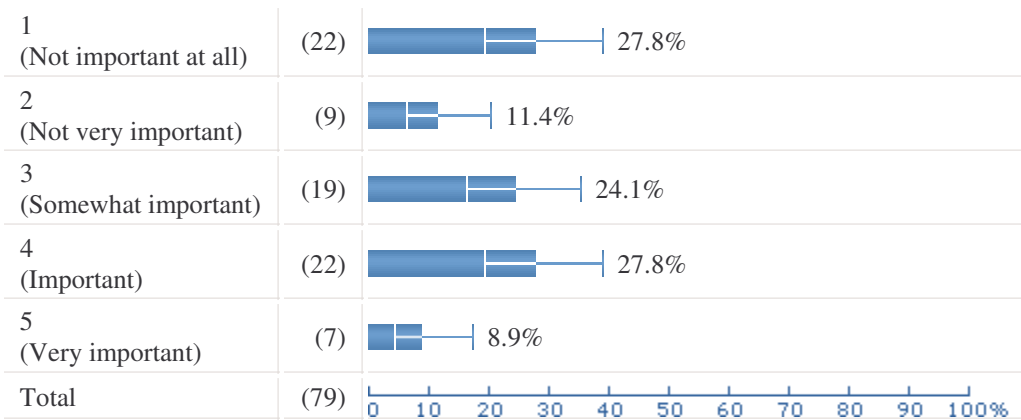
*Answers not displayed.*

An answer to this question is not required and 75 of 79 respondents chose not to answer.

x) **Recent Reuse Experiences**

17) **For any of the newly written software, was there software from another source that might have provided *\*any\** of the capabilities needed? If so, how important were the following factors in preventing you from reusing that software?**

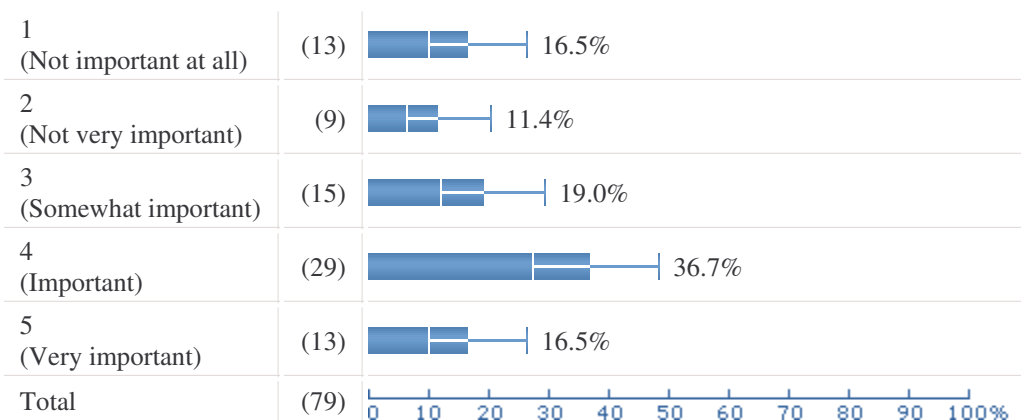
17a) a) I didn't know other software existed at the time



Confidence: +/-9.8%

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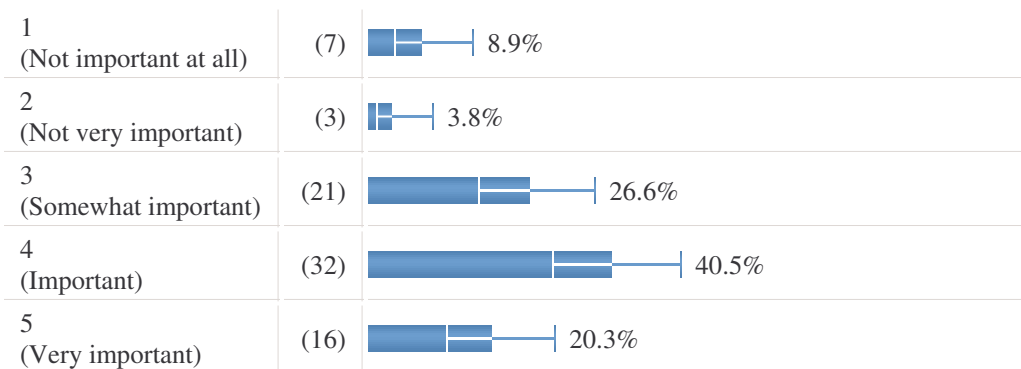
17b) b) Other software wasn't compatible with my system



Confidence: +/-10.5%

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17c) c) Other software didn't exactly match my requirements









Total	(79)	
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Confidence: +/-10.7%

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17d) d) Other software was difficult to understand or poorly documented

1 (Not important at all)	(8)	
2 (Not very important)	(4)	
3 (Somewhat important)	(21)	
4 (Important)	(22)	
5 (Very important)	(24)	
Total	(79)	

Confidence: +/-10.1%

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17e) e) Other software was too complex or difficult to adapt to my needs

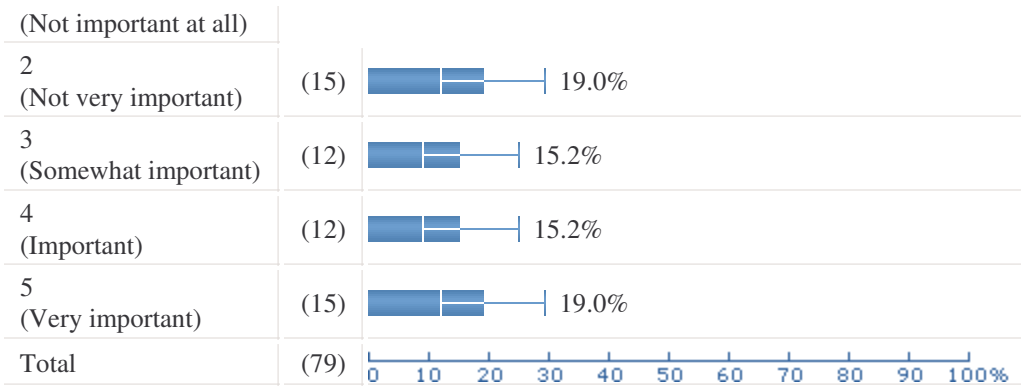
1 (Not important at all)	(8)	
2 (Not very important)	(7)	
3 (Somewhat important)	(19)	
4 (Important)	(28)	
5 (Very important)	(17)	
Total	(79)	

Confidence: +/-10.4%

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17f) f) It was hard to overcome licensing restrictions

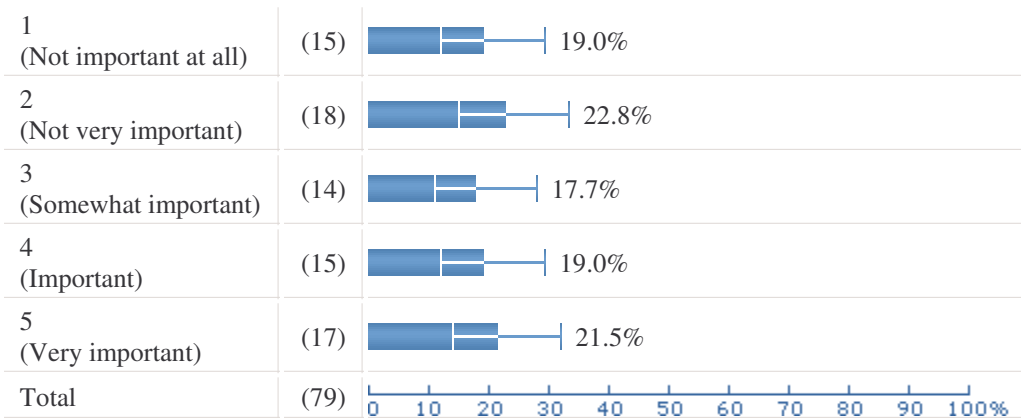
1	(25)	
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Confidence: +/-10.2%

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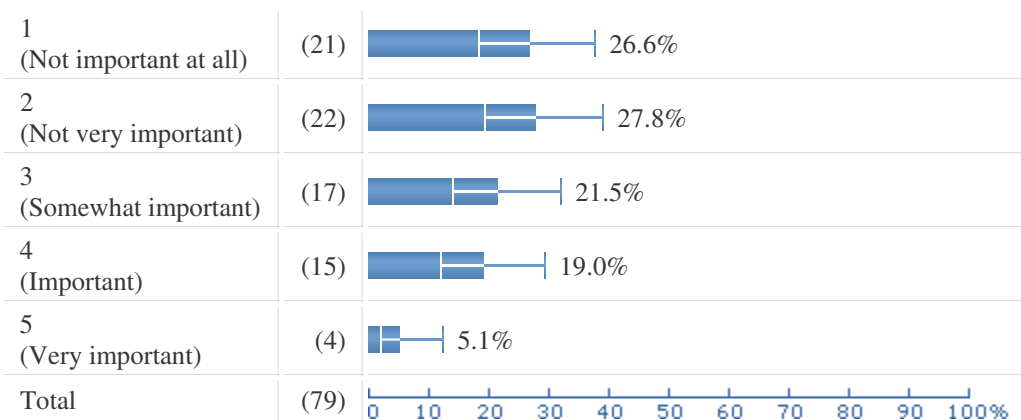
17g) g) I needed the source code and it wasn't available



Confidence: +/-9.2%

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17h) h) I preferred to have the development take place within my project or wanted the experience of developing the needed capability

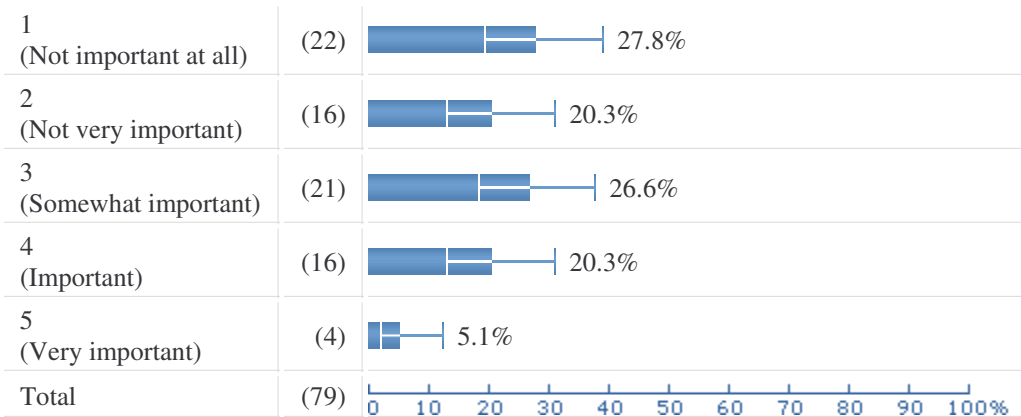




Confidence: +/-9.8%

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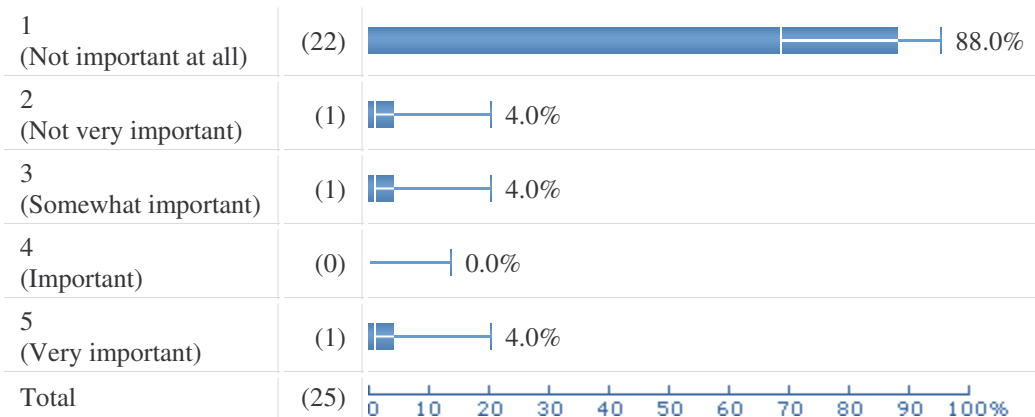
17i) i) I didn't like how the other software was designed/implemented



Confidence: +/-9.8%

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17j) j) Other



Confidence: +/-13.3%

An answer to this question is not required and 54 of 79 respondents chose not to answer.

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18) If Other, please specify what other factors prevented you from reusing existing software:

*Answers not displayed.*

An answer to this question is not required and 78 of 79 respondents chose not to answer.

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xi) **Recent Reuse Experiences**

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19) **The Software Reuse Working Group is very interested in identifying some of the artifacts that have been successfully reused by the community. Please help us by listing a few of the artifacts that you have reused over the last five years.**

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19a) Name of Artifact:

*Answers not displayed.*

An answer to this question is not required and 14 of 79 respondents chose not to answer.

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19b) Source Organization of Artifact:

*Answers not displayed.*

An answer to this question is not required and 21 of 79 respondents chose not to answer.

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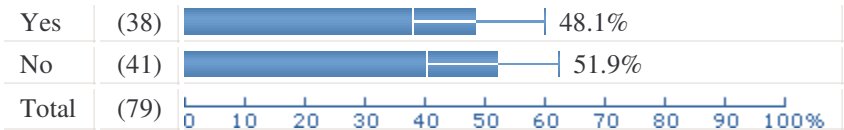
19c) Reference or URL of Artifact:

*Answers not displayed.*

An answer to this question is not required and 36 of 79 respondents chose not to answer.

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20) Another Artifact?



Confidence: +/-10.9%

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xii)

## Recent Reuse Experiences

This question is asked if the answer to question 20 is *Yes*.

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### 21) Any information about this artifact will be appreciated.

This question is asked if the answer to question 20 is *Yes*.

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#### 21a) Name of Artifact:

*Answers not displayed.*

This question is asked if the answer to question 20 is *Yes*.

An answer to this question is not required and 1 of 38 respondents chose not to answer.

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#### 21b) Source Organization of Artifact:

*Answers not displayed.*

This question is asked if the answer to question 20 is *Yes*.

An answer to this question is not required and 7 of 38 respondents chose not to answer.

---

#### 21c) Reference or URL of Artifact:

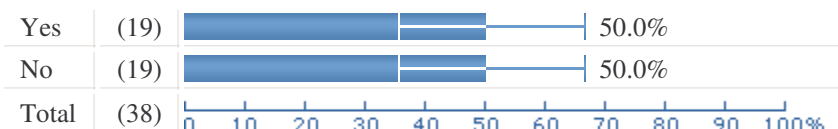
*Answers not displayed.*

This question is asked if the answer to question 20 is *Yes*.

An answer to this question is not required and 11 of 38 respondents chose not to answer.

---

### 22) Another Artifact?



Confidence: +/-15.4%

This question is asked if the answer to question 20 is *Yes*.

---

## Recent Reuse Experiences

This question is asked if the answer to question 22 is *Yes*.

### 23) Any information about this artifact will be appreciated.

This question is asked if the answer to question 22 is *Yes*.

23a) Name of Artifact:

*Answers not displayed.*

This question is asked if the answer to question 22 is *Yes*.

An answer to this question is not required and 2 of 19 respondents chose not to answer.

23b) Source Organization of Artifact:

*Answers not displayed.*

This question is asked if the answer to question 22 is *Yes*.

An answer to this question is not required and 7 of 19 respondents chose not to answer.

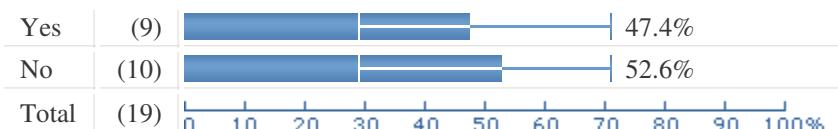
23c) Reference or URL of Artifact:

*Answers not displayed.*

This question is asked if the answer to question 22 is *Yes*.

An answer to this question is not required and 7 of 19 respondents chose not to answer.

24) Another Artifact?



Confidence:  $\pm 21.1\%$

This question is asked if the answer to question 22 is *Yes*.

## Recent Reuse Experiences

This question is asked if the answer to question 24 is *Yes*.

### 25) Any information about this artifact will be appreciated.

This question is asked if the answer to question 24 is *Yes*.

25a) Name of Artifact:

*Answers not displayed.*

This question is asked if the answer to question 24 is *Yes*.

An answer to this question is not required and 0 of 9 respondents chose not to answer.

25b) Source Organization of Artifact:

*Answers not displayed.*

This question is asked if the answer to question 24 is *Yes*.

An answer to this question is not required and 2 of 9 respondents chose not to answer.

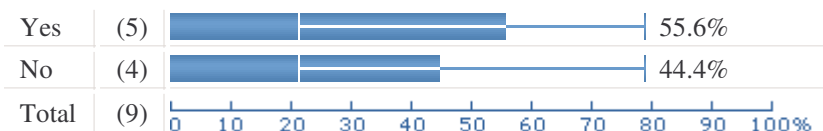
25c) Reference or URL of Artifact:

*Answers not displayed.*

This question is asked if the answer to question 24 is *Yes*.

An answer to this question is not required and 2 of 9 respondents chose not to answer.

26) Another Artifact?



Confidence:  $\pm 28.8\%$

This question is asked if the answer to question 24 is *Yes*.

xv)

## Recent Reuse Experiences

This question is asked if the answer to question 26 is *Yes*.

---

27) **Any information about this artifact will be appreciated.**

**This question is asked if the answer to question 26 is *Yes*.**

---

27a) Name of Artifact:

*Answers not displayed.*

This question is asked if the answer to question 26 is *Yes*.

An answer to this question is not required and 0 of 5 respondents chose not to answer.

---

27b) Source Organization of Artifact:

*Answers not displayed.*

This question is asked if the answer to question 26 is *Yes*.

An answer to this question is not required and 0 of 5 respondents chose not to answer.

---

27c) Reference or URL of Artifact:

*Answers not displayed.*

This question is asked if the answer to question 26 is *Yes*.

An answer to this question is not required and 0 of 5 respondents chose not to answer.

---

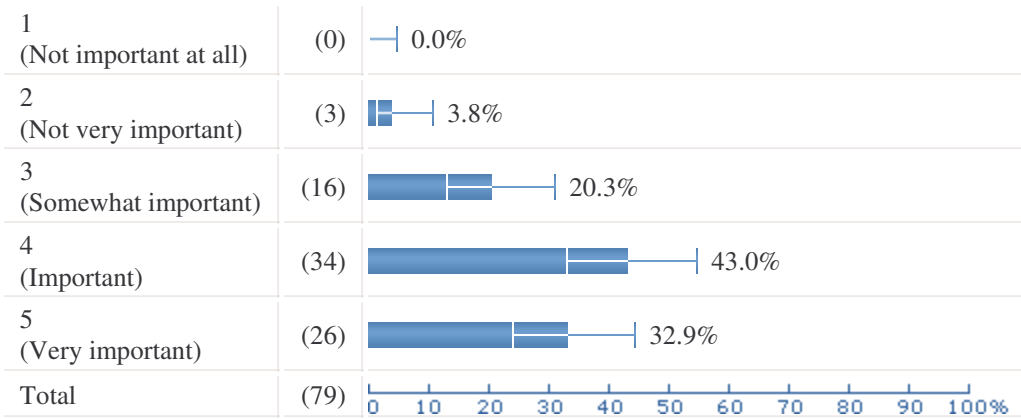
xvi) **Recent Reuse Experiences**

---

28) **How effective were the following in helping you locate and acquire software development artifacts?**

---

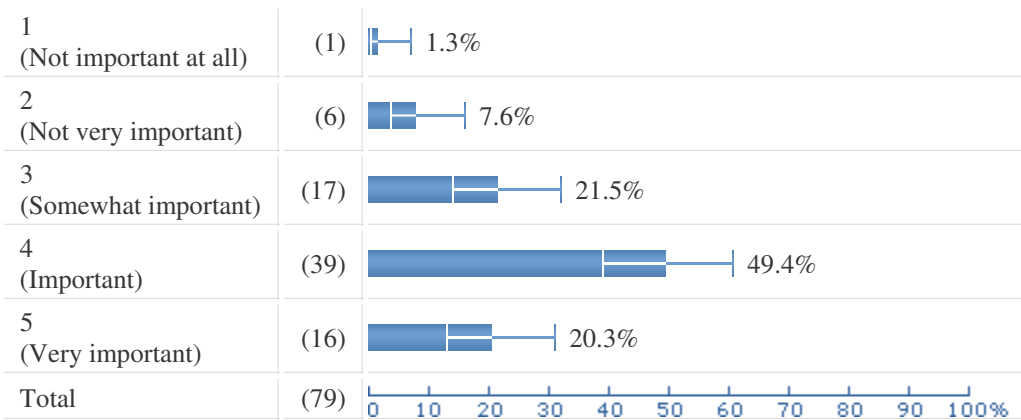
28a) a) Personal knowledge from past projects



Confidence: +/-10.8%

---

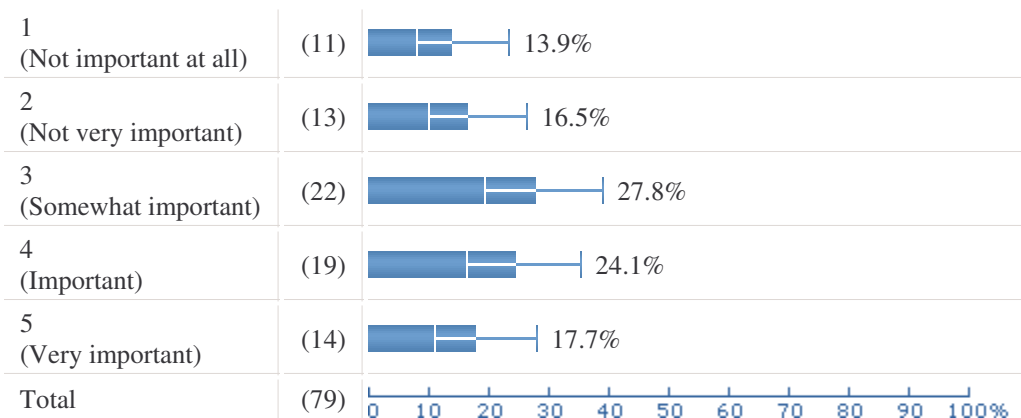
28b) b) Word of mouth/networking



Confidence: +/-10.9%

---

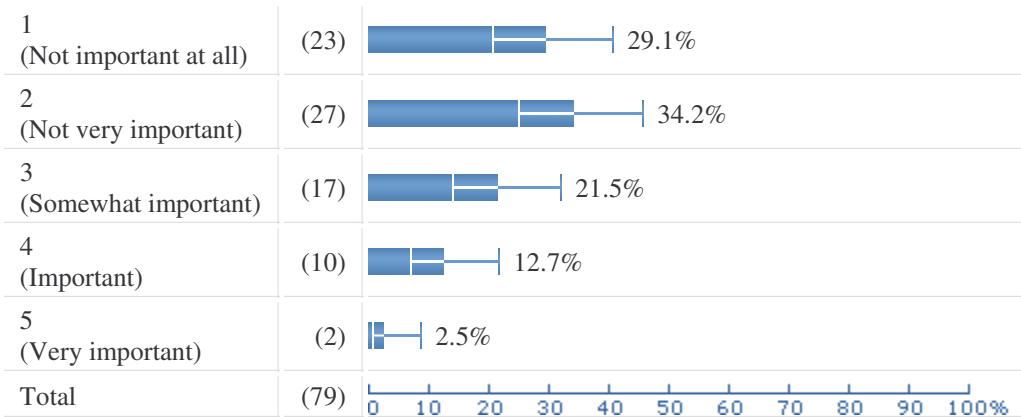
28c) c) Google search or similar



Confidence: +/-9.8%

---

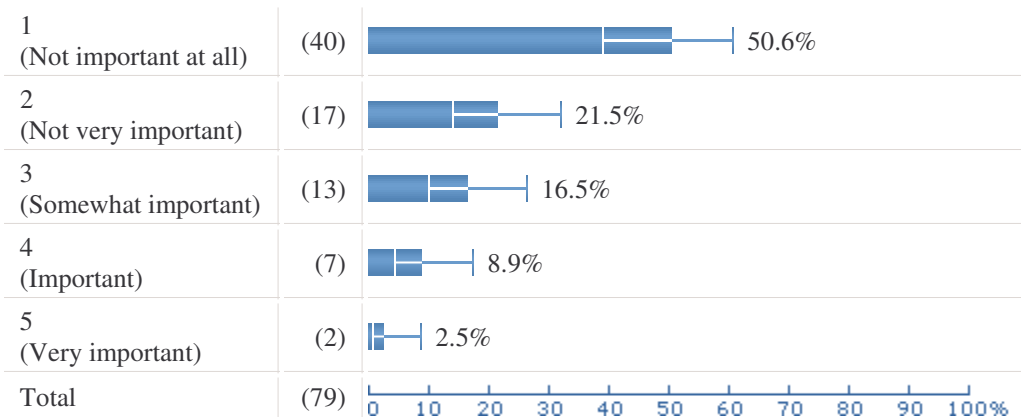
28d) d) Serendipity



Confidence: +/-10.4%

---

28e) e) Reuse catalog or repository



Confidence: +/-10.9%

---

29) Please list the catalogs or repositories you have used:

*Answers not displayed.*

An answer to this question is not required and 67 of 79 respondents chose not to answer.



---

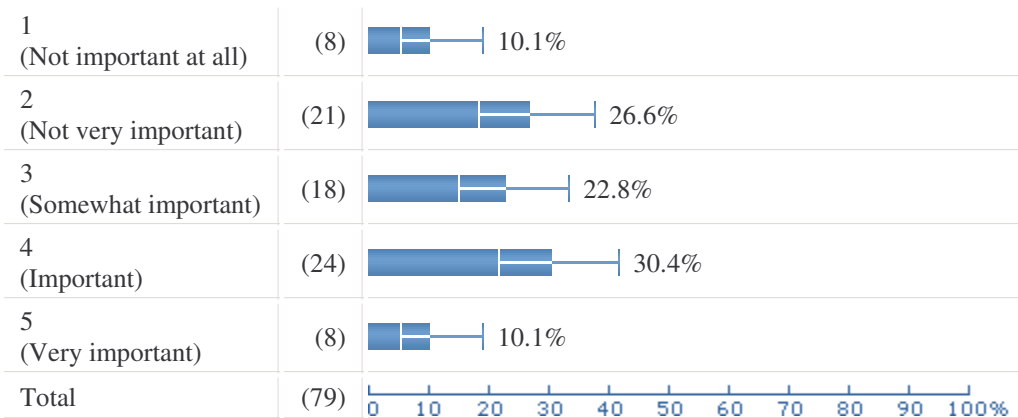
xvii) **Recent Reuse Experiences**

---

30) **When evaluating software development artifacts for reuse, how important are the following factors in influencing your decision to reuse an artifact?**

---

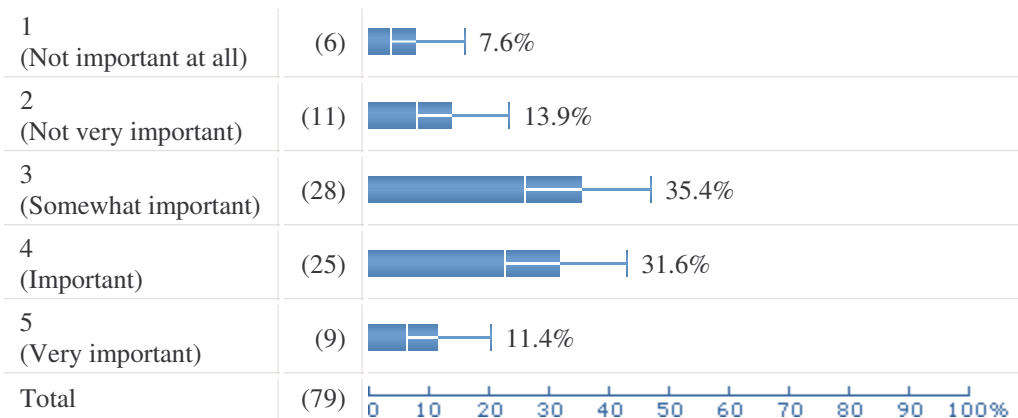
30a) a) Knowledge of author



Confidence: +/-10.1%

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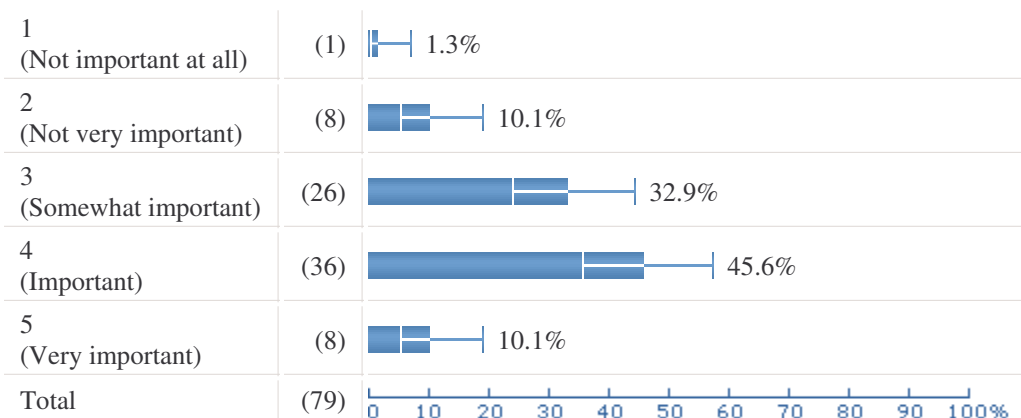
30b) b) Testing/certification



Confidence: +/-10.4%

---

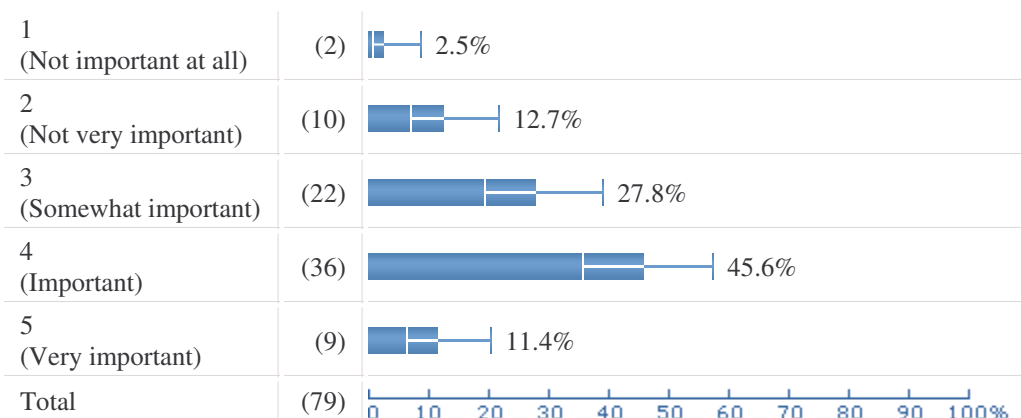
30c) c) Recommendation from colleague



Confidence: +/-10.8%

---

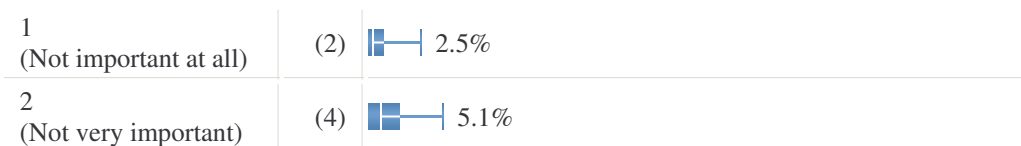
30d) d) Standards compliance

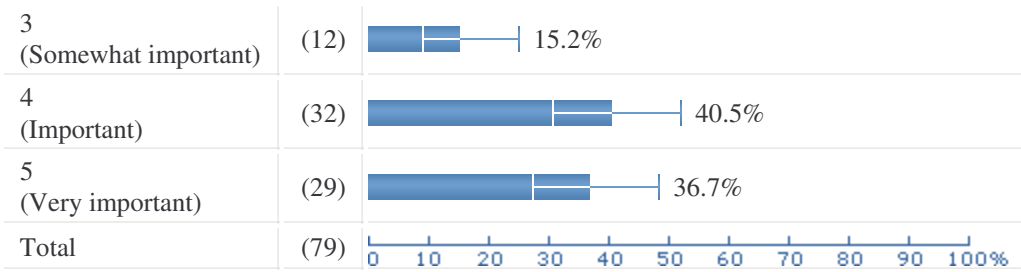


Confidence: +/-10.8%

---

30e) e) Availability of source code

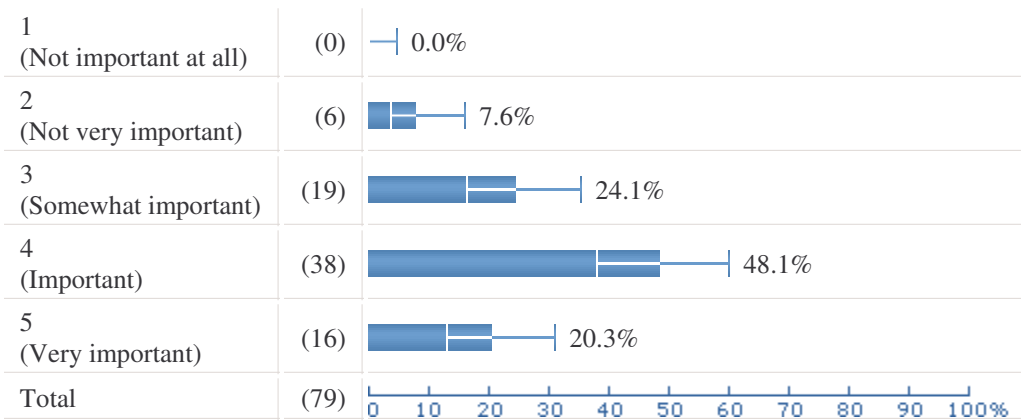




Confidence: +/-10.7%

---

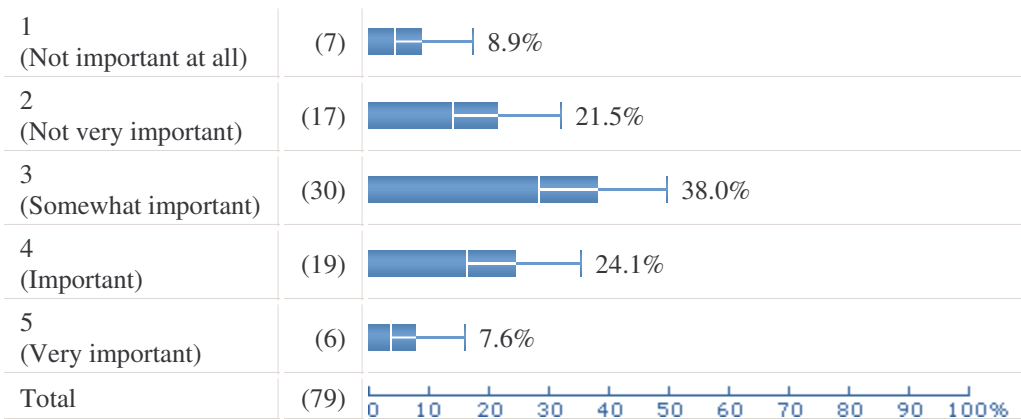
30f) f) Quality of documentation



Confidence: +/-10.9%

---

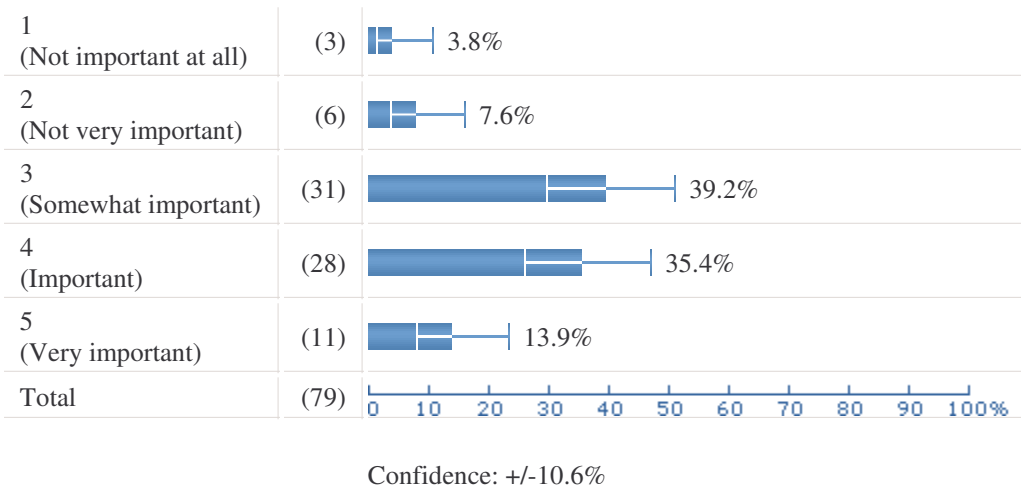
30g) g) Availability of support/maintenance



Confidence: +/-10.6%

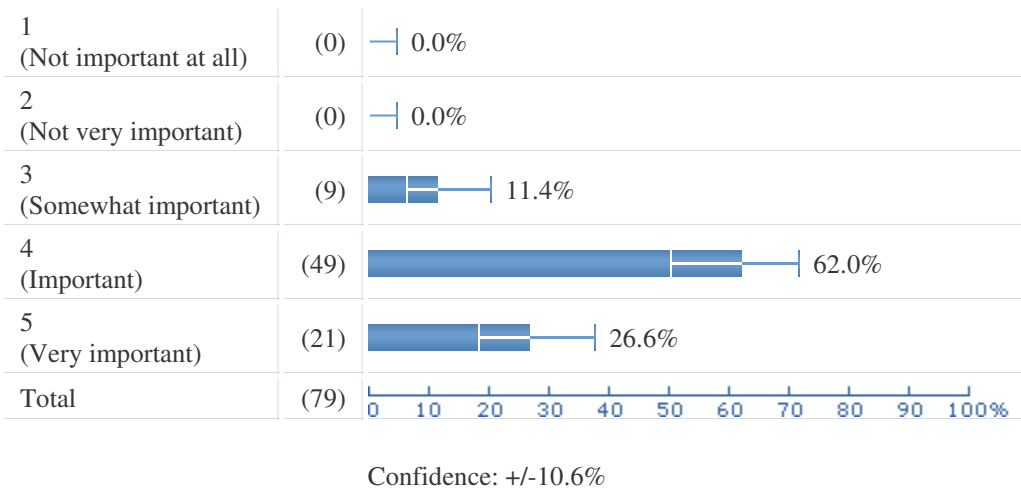
---

30h) h) Low dependency on other artifacts



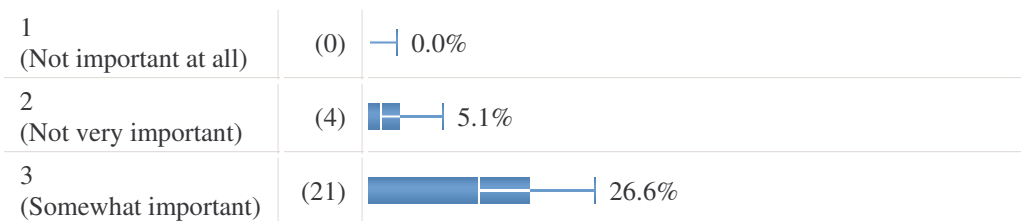

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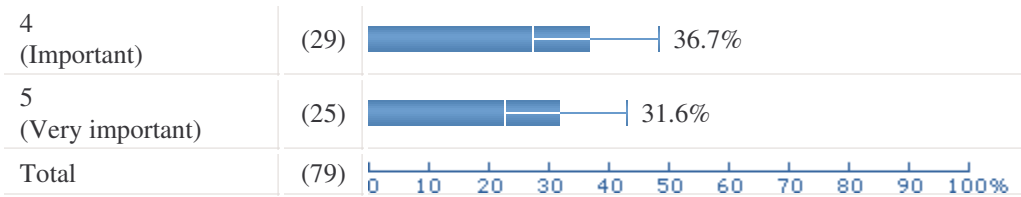
30i) i) Ease of adaptation/integration




---

30j) j) Cost of creating/acquiring alternative

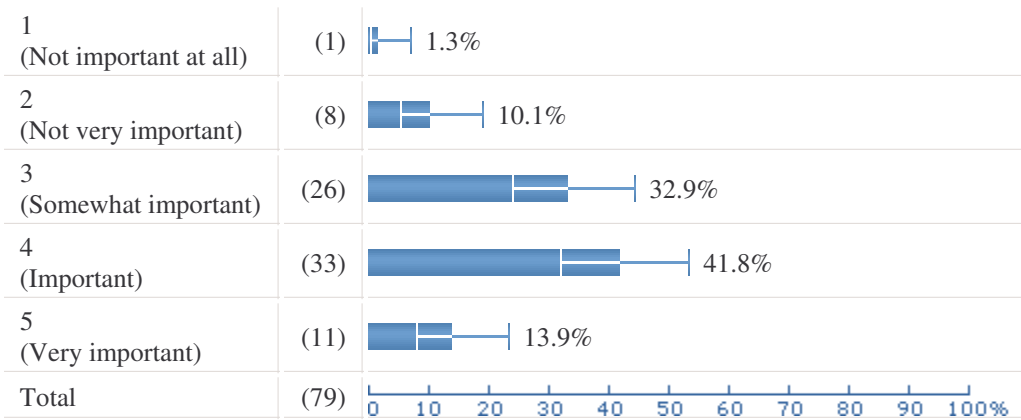




Confidence: +/-10.5%

---

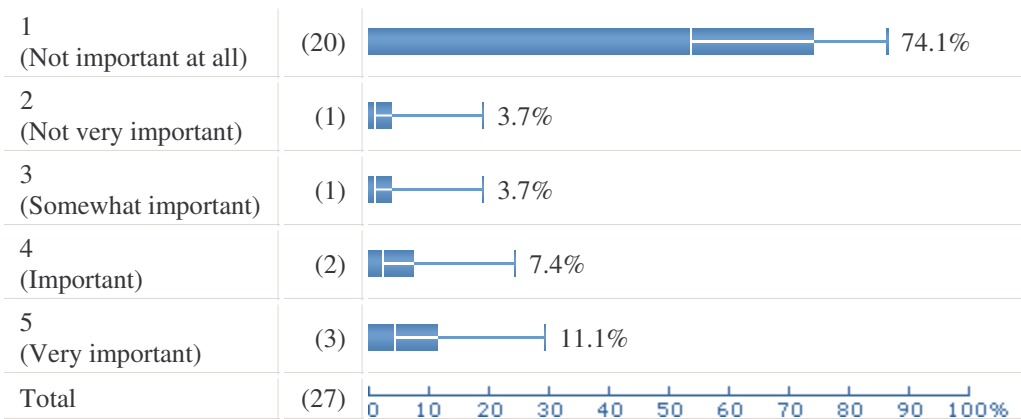
30k) k) Complexity of functionality



Confidence: +/-10.7%

---

30l) l) Other



Confidence: +/-16.3%

An answer to this question is not required and 52 of 79 respondents chose not to answer.

---

31) If other, please specify any other factors that have influenced your decision to use an artifact in the past:

*Answers not displayed.*

An answer to this question is not required and 73 of 79 respondents chose not to answer.

---

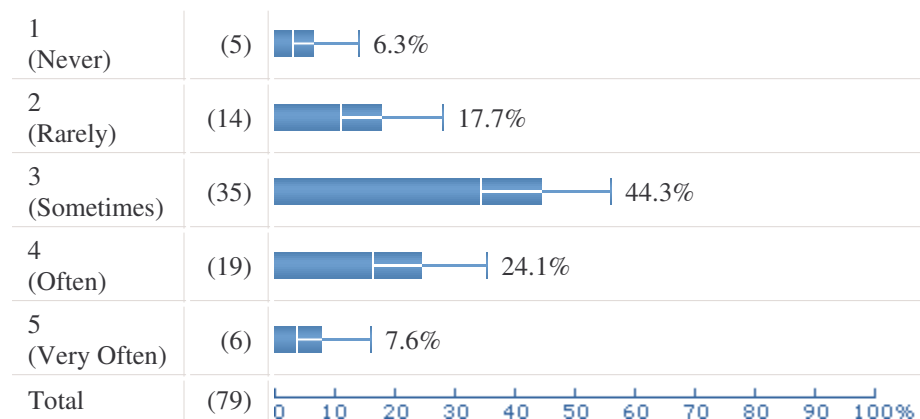
xviii) **Recent Reuse Experiences**

---

32) **For software development artifacts that you've reused in the last five years, how often have you**

---

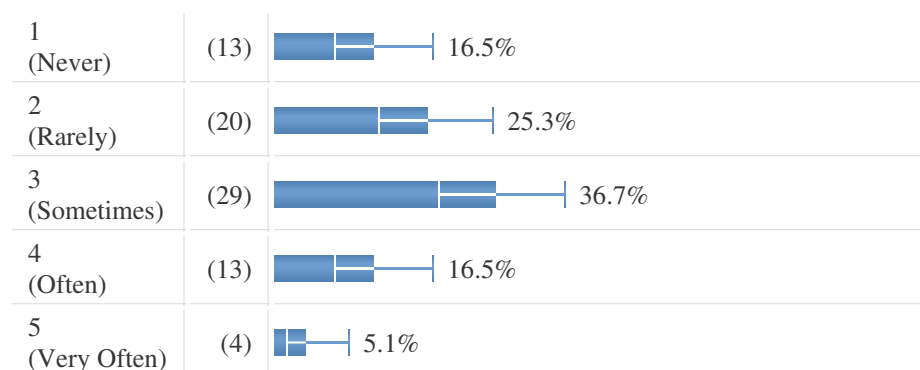
32a) a) Modified the artifacts?

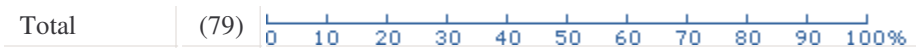


Confidence: +/-10.8%

---

32b) b) Communicated the changes back to the original developer(s) of those artifacts

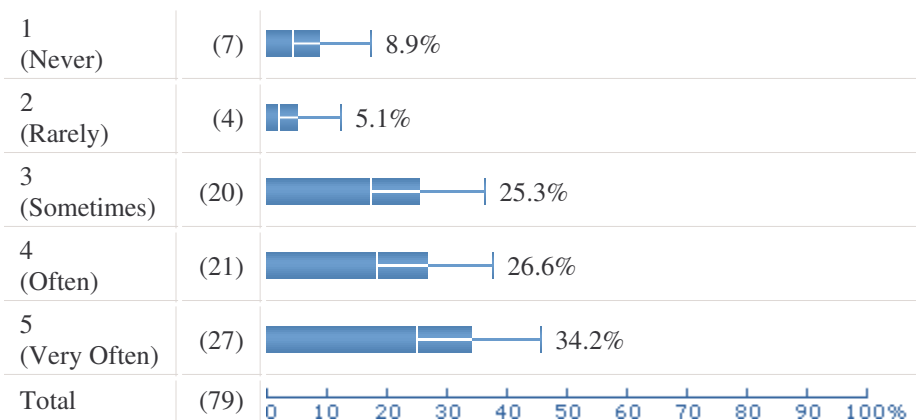




Confidence: +/-10.5%

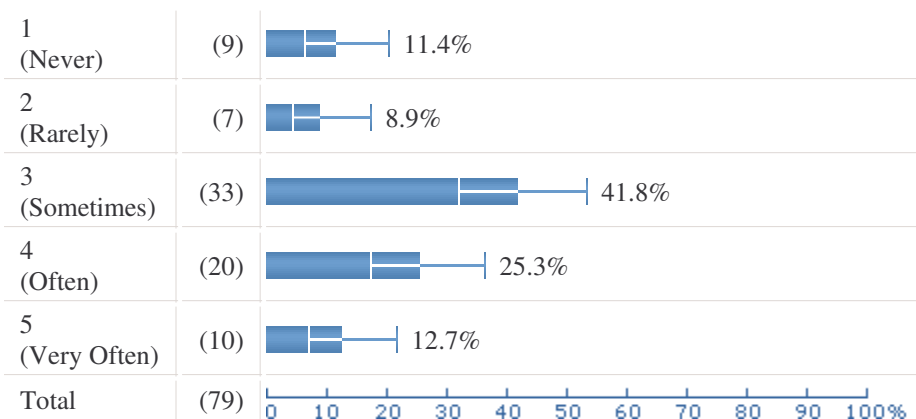
33) Now thinking about licensing for reuse: for software development artifacts that you've reused in the last five years, how often have you

33a) a) Used open source software?



Confidence: +/-10.4%

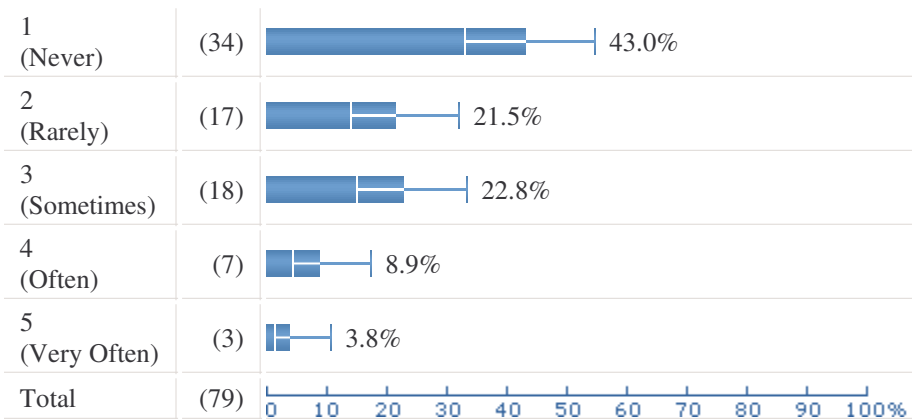
33b) b) Used a shareware/public domain software?



Confidence: +/-10.7%

---

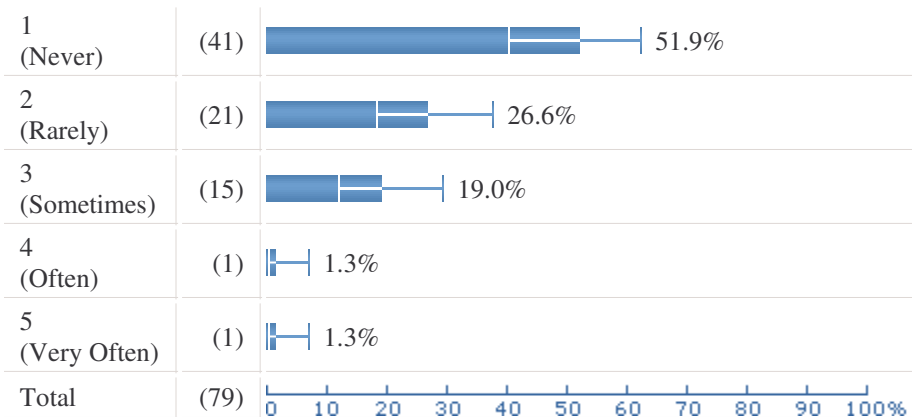
33c) c) Used a formal license agreement with the artifact developer?



Confidence: +/-10.8%

---

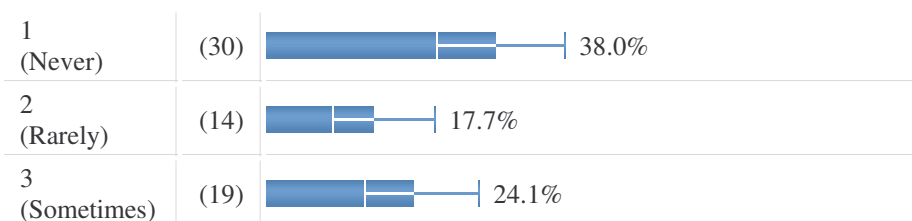
33d) d) Used a semi-formal agreement (e.g. Memorandum of Understanding) with the artifact developer?



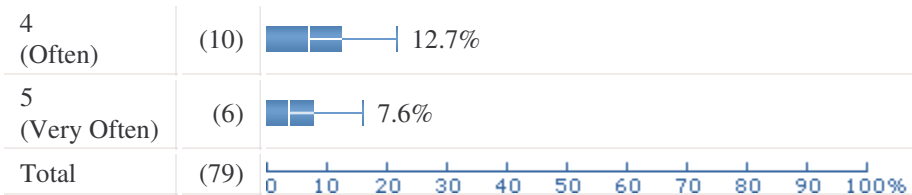
Confidence: +/-10.9%

---

33e) e) Reused the artifacts without a formal license?







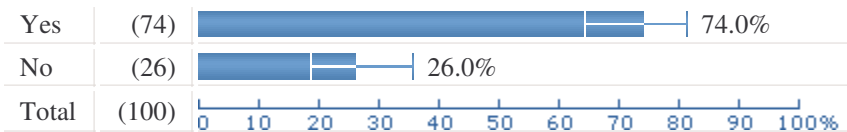
Confidence: +/-10.6%

xix)

## Reusability

**Definition of Reusability:** *Reusability is the ability of a software development artifact to be reused, in whole or in part, in new systems.*

34) Over the last five years, have you made any of your software development artifacts available for people outside of your project or group?



Confidence: +/-8.6%

xx) Go to question xxii if question 34 is No

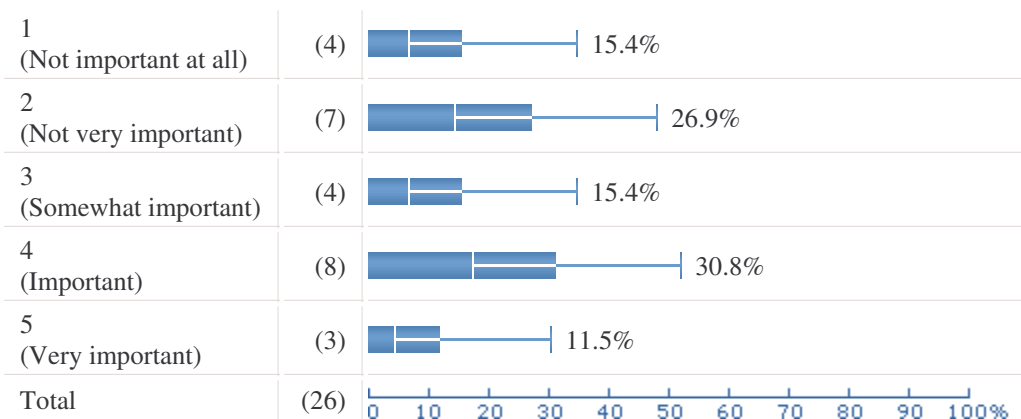
xxi) Go to question xxiv if question 34 is Yes

xxii) **Reusability**

35) How important were the following factors in preventing you from making your software development artifacts

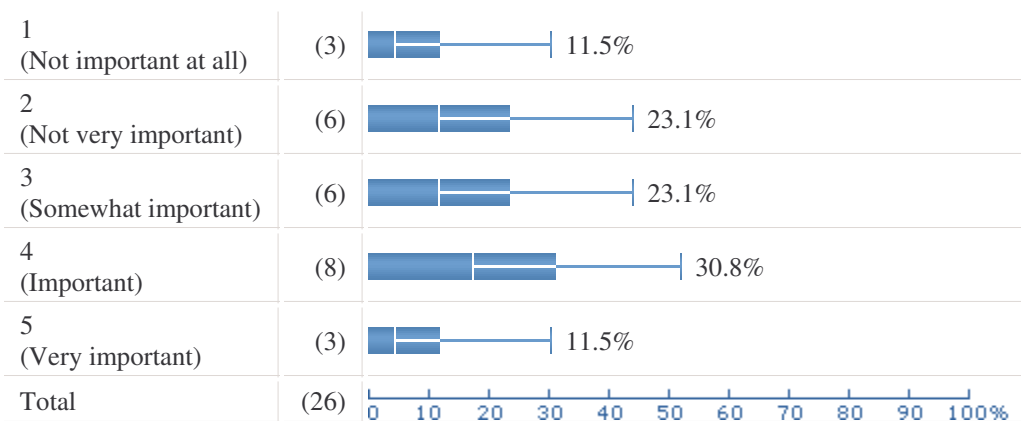
available for reuse?

35a) a) Not knowing how



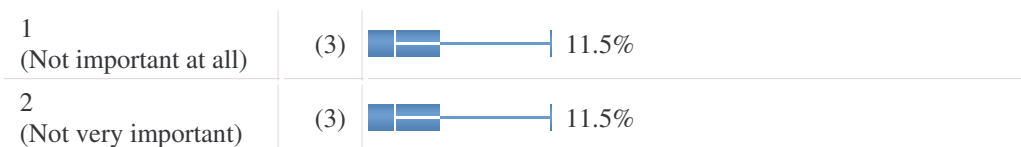
Confidence: +/-17.3%

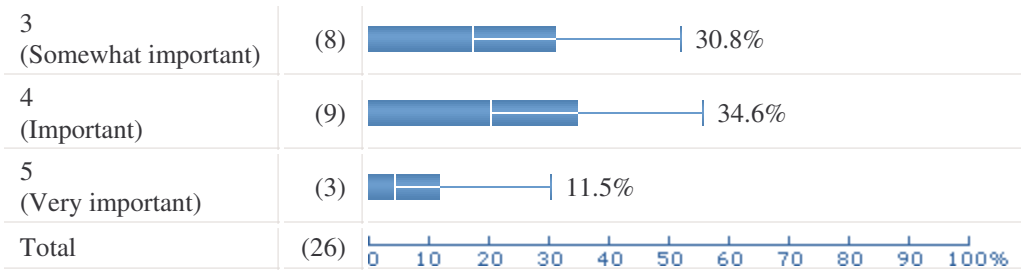
35b) b) Cost of developing for reuse



Confidence: +/-17.3%

35c) c) Not knowing if it will be useful

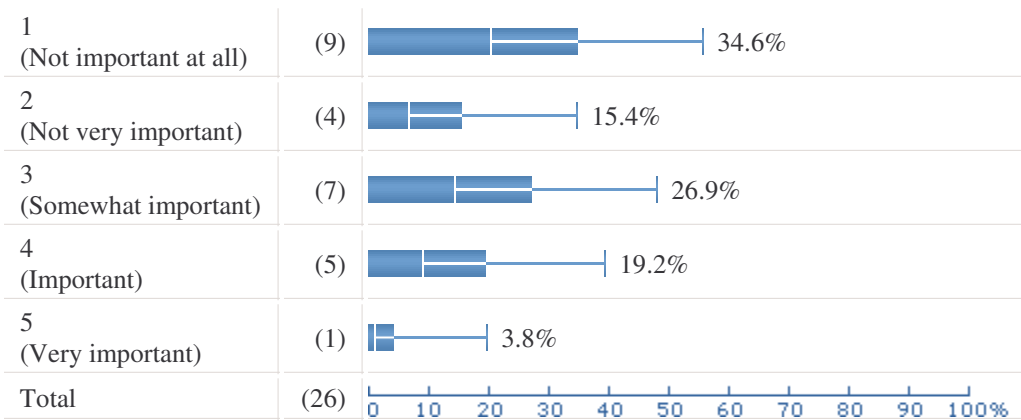




Confidence: +/-17.7%

---

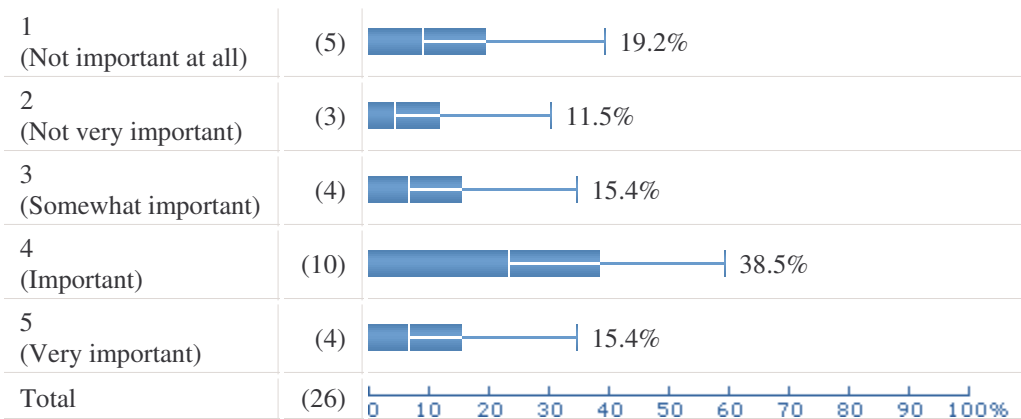
35d) d) Your organization's software release policy limitations



Confidence: +/-17.7%

---

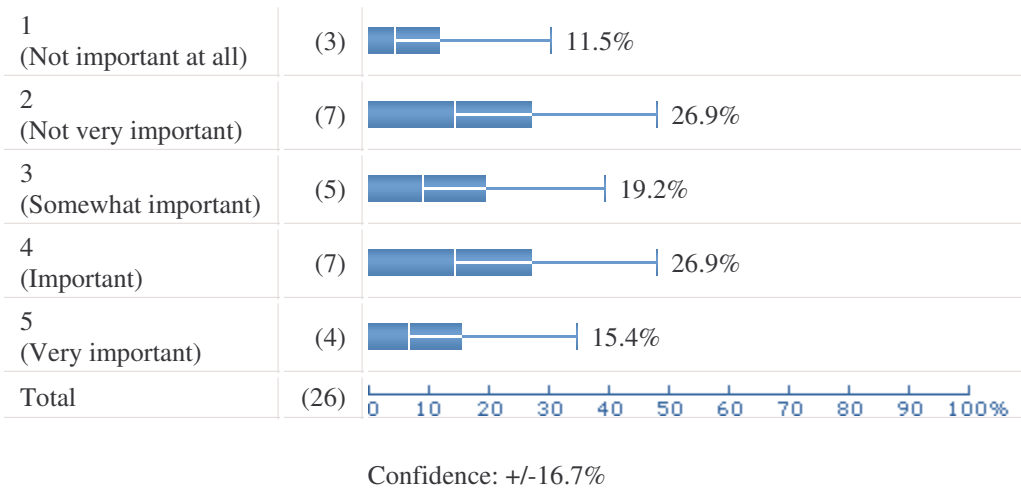
35e) e) Support and maintenance



Confidence: +/-18.0%

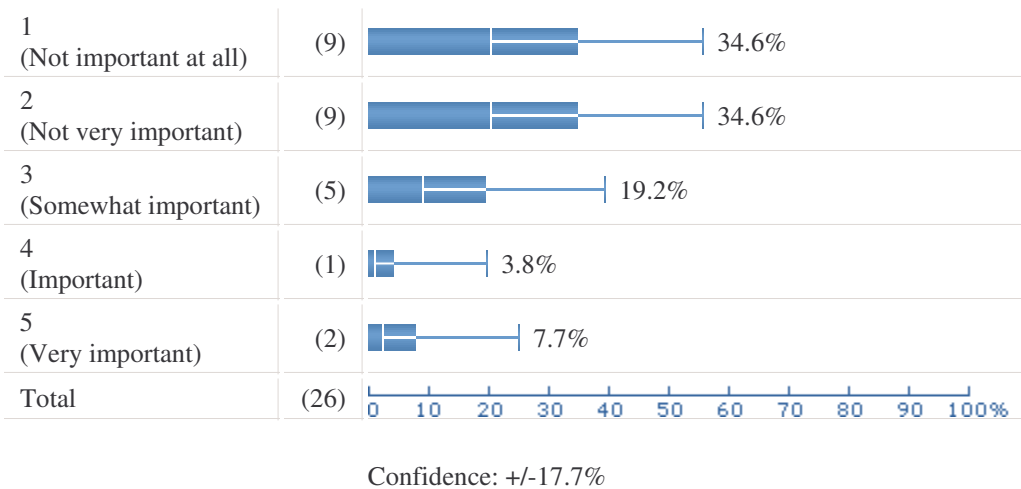
---

35f) f) No standard way for distribution



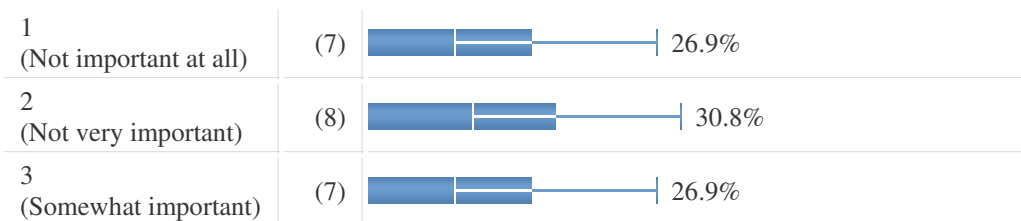

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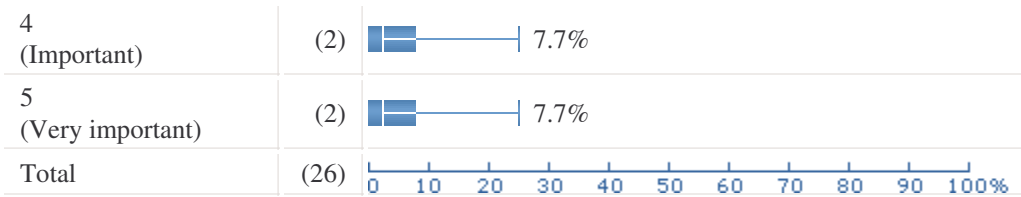
35g) g) Concern over losing competitive advantage




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35h) h) Concern over losing intellectual property

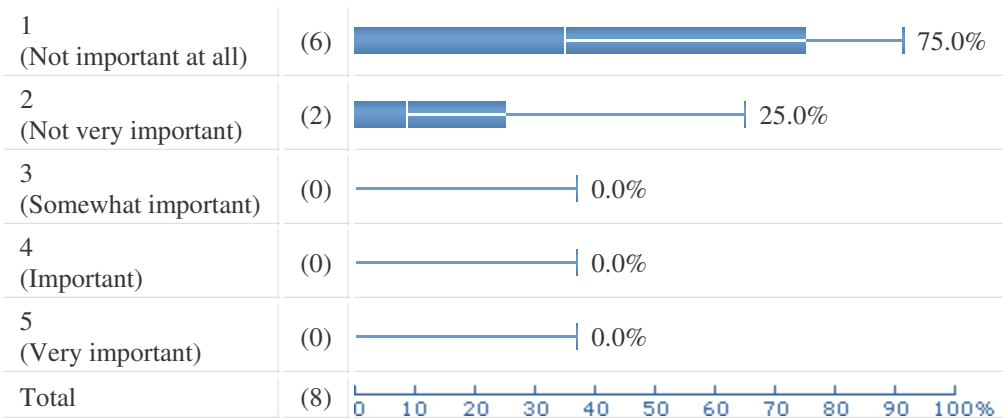




Confidence: +/-17.3%

---

35i) i) Other



Confidence: +/-28.3%

An answer to this question is not required and 18 of 26 respondents chose not to answer.

---

36) If Other, please specify what prevented you from making your software development artifacts available for reuse outside of your group:

*Answers not displayed.*

An answer to this question is not required and 25 of 26 respondents chose not to answer.

---

xxiii) Go to question xxviii if question 34 is No

---

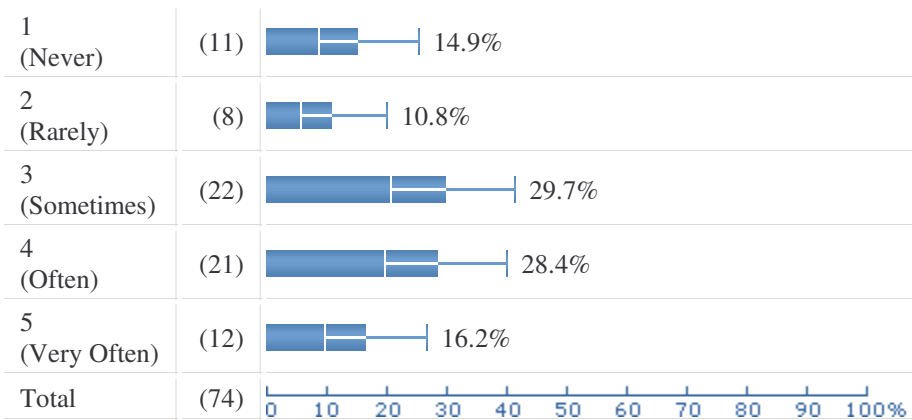
xxiv) **Reusability**

---

37) **How often have you built the following types of software development artifacts in a way that they can be more readily reused outside of your project?**

---

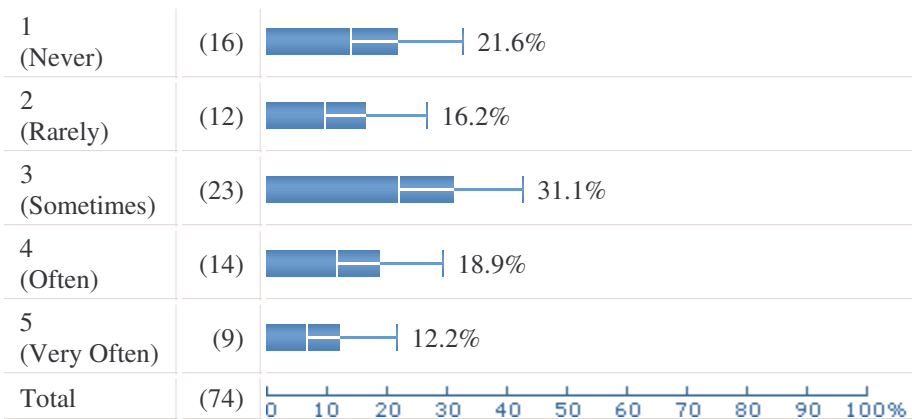
37a) a) Algorithms, Techniques



Confidence: +/-10.3%

---

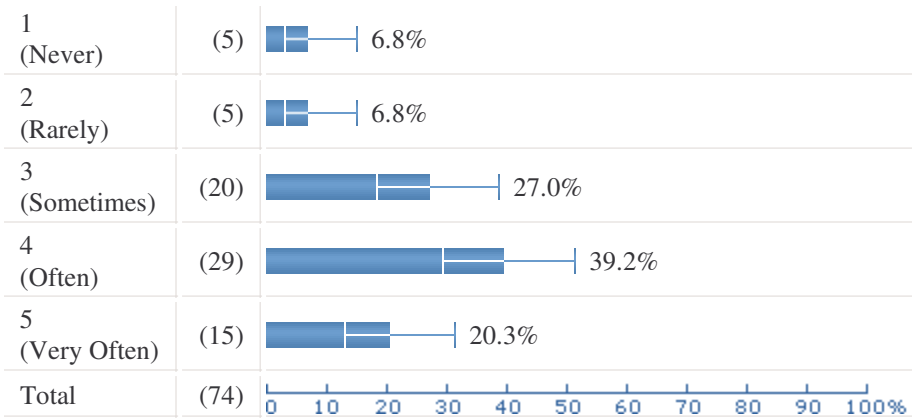
37b) b) Designs, Architectures



Confidence: +/-10.5%

---

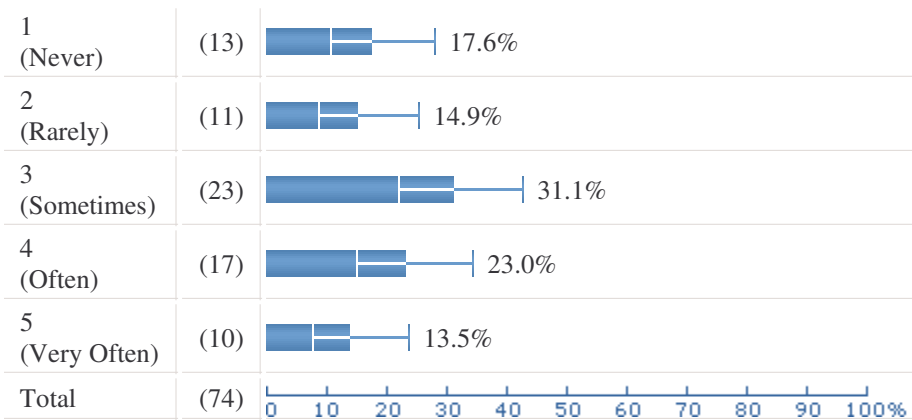
37c) c) Source code, Scripts



Confidence: +/-11.0%

---

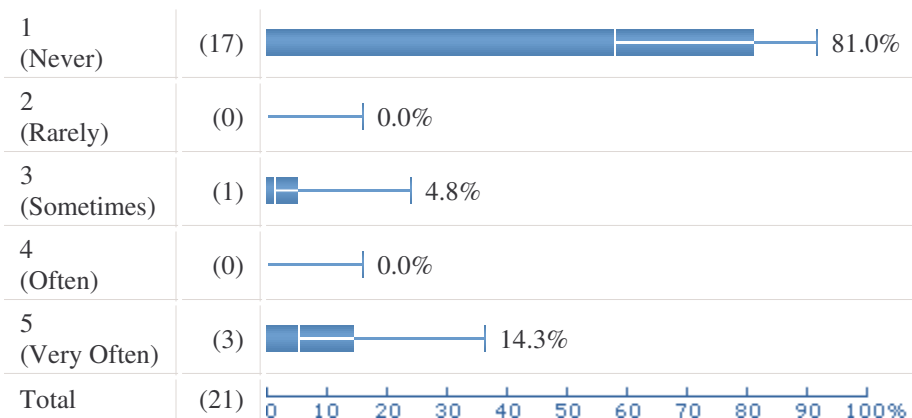
#### 37d) d) Executables, Binaries



Confidence: +/-10.5%

---

#### 37e) e) Other



Confidence: +/-16.8%

An answer to this question is not required and 53 of 74 respondents chose not to answer.

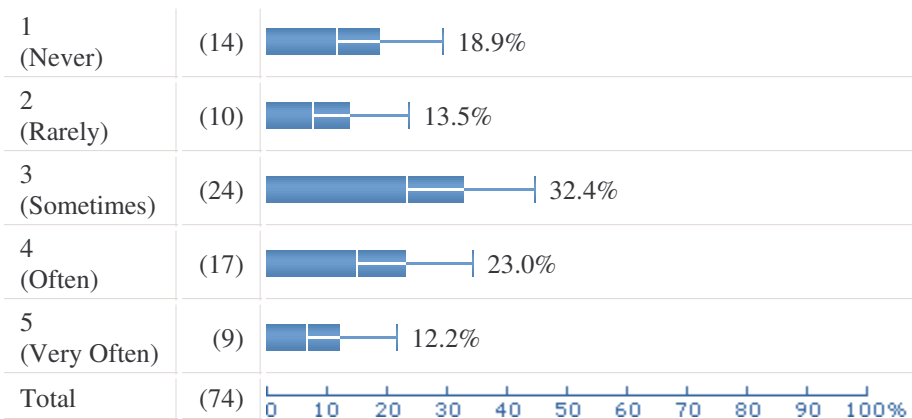
- 
- 38) If Other, please specify what other types of software development artifacts you have built in a way that they can be readily reused outside of your project:

*Answers not displayed.*

An answer to this question is not required and 73 of 74 respondents chose not to answer.

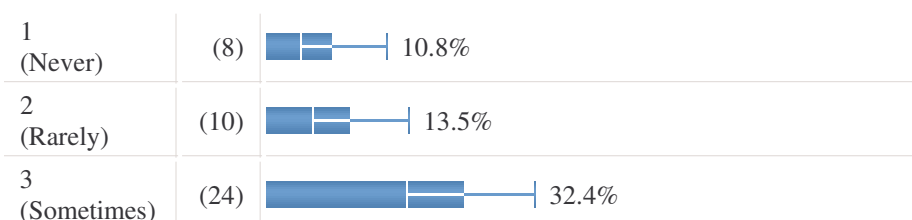
- 
- 39) **How often have you developed the following types of software in a way that they can be more readily reused outside of your project?**

- 
- 39a) a) Complete solutions or applications

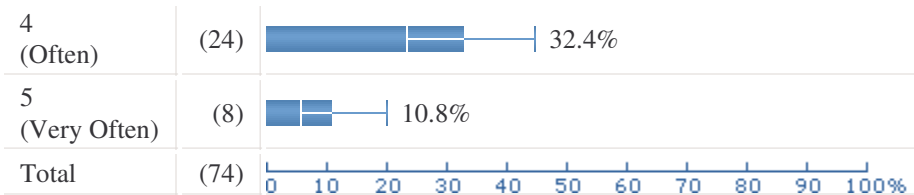


Confidence: +/-10.6%

- 
- 39b) b) Subsystems or components



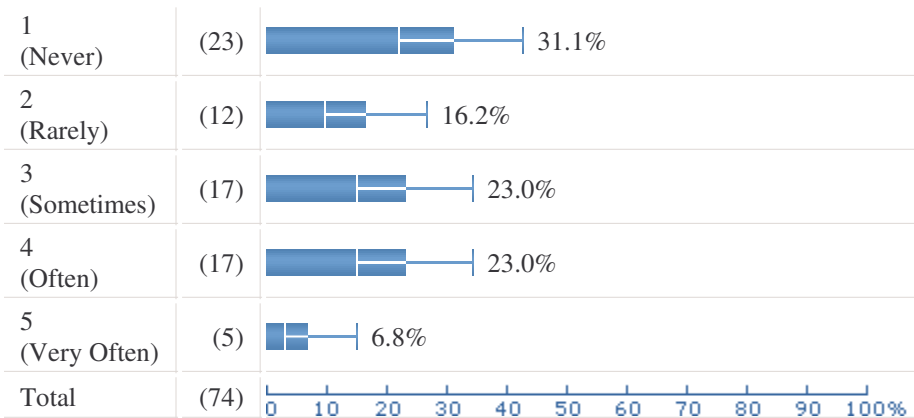




Confidence: +/-10.6%

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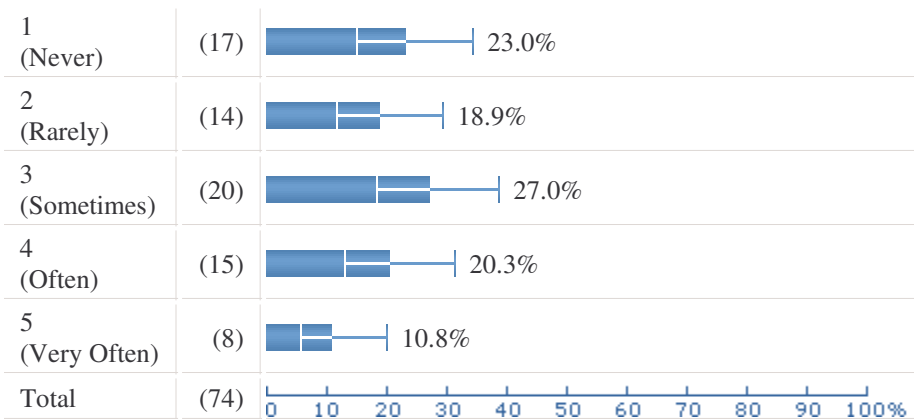
### 39c) c) Code libraries



Confidence: +/-10.5%

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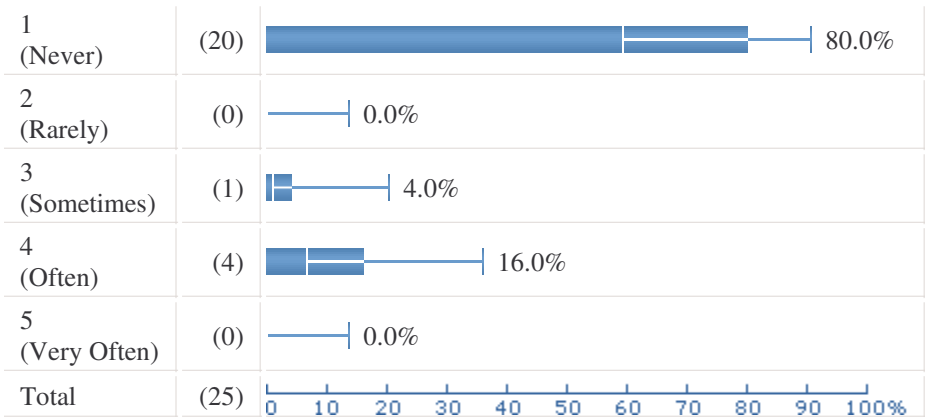
### 39d) d) Code fragments



Confidence: +/-10.1%

---

39e) e) Other



Confidence: +/-15.7%

An answer to this question is not required and 49 of 74 respondents chose not to answer.

40) If Other, please specify what other types of software you have developed in a way that they can be readily reused outside of your project:

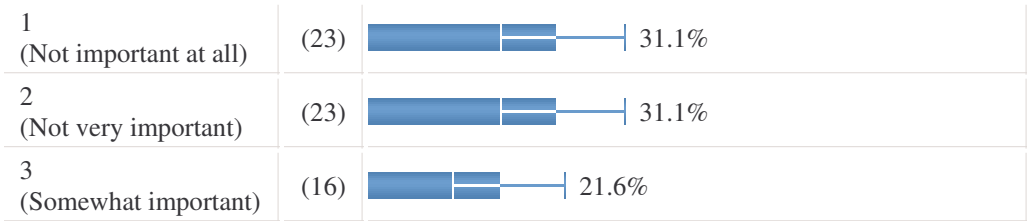
Answers not displayed.

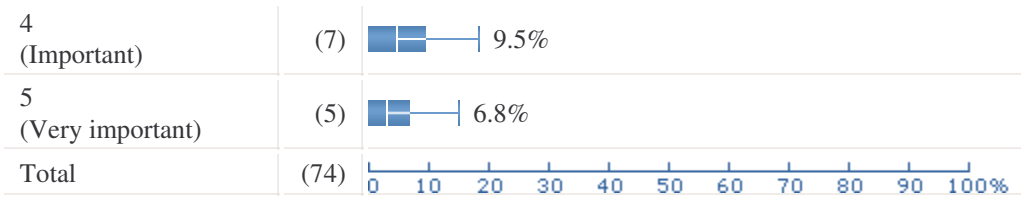
An answer to this question is not required and 72 of 74 respondents chose not to answer.

xxv) **Reusability**

41) **How important were the following factors in preventing you from making your artifacts available for reuse?**

41a) a) Not knowing how

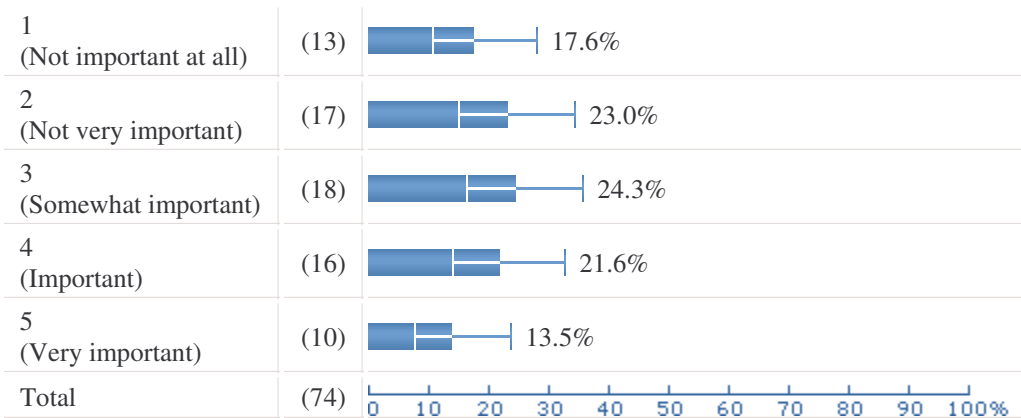




Confidence: +/-10.5%

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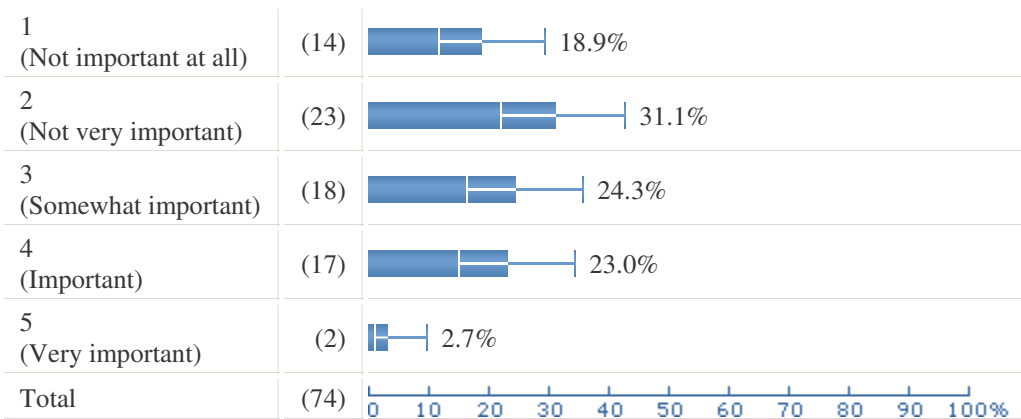
41b) b) Cost of developing for reuse



Confidence: +/-9.7%

---

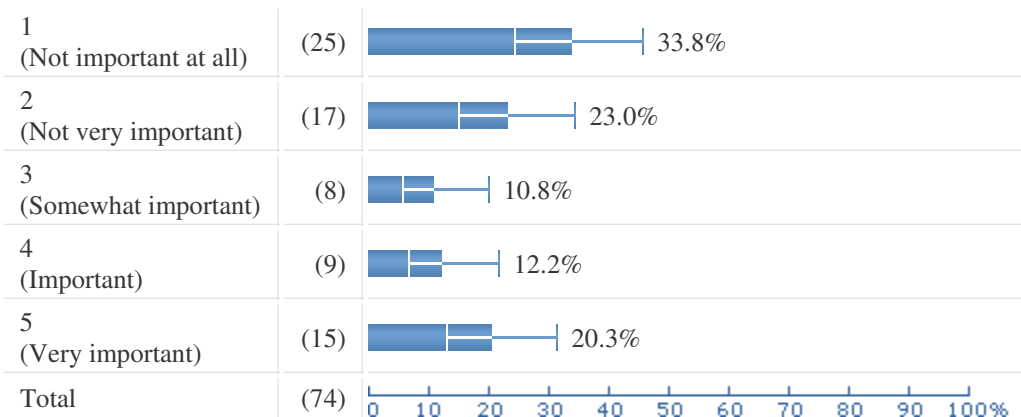
41c) c) Not knowing if it will be useful



Confidence: +/-10.5%

---

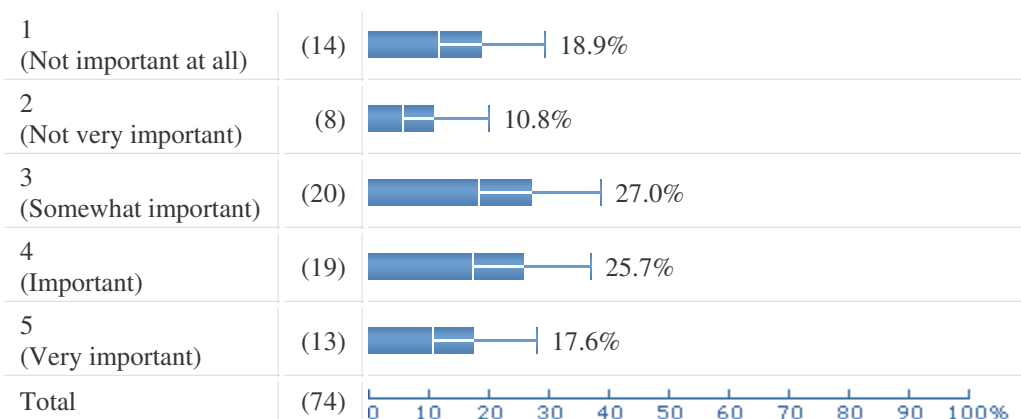
41d) d) Your organization's software release policy limitations



Confidence: +/-10.7%

---

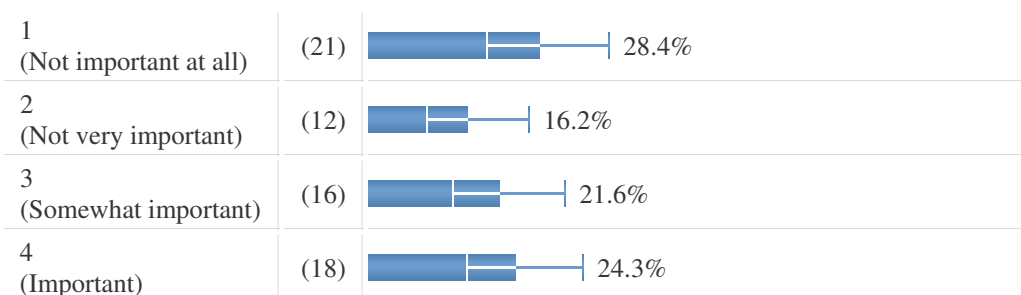
41e) e) Support and maintenance





Confidence: +/-10.1%

---

41f) f) No standard way for distribution









5 (Very important)	(7)		9.5%
Total	(74)		

Confidence: +/-10.2%

---







41g) g) Concern over losing competitive advantage

1 (Not important at all)	(35)		47.3%
2 (Not very important)	(15)		20.3%
3 (Somewhat important)	(12)		16.2%
4 (Important)	(8)		10.8%
5 (Very important)	(4)		5.4%
Total	(74)		

Confidence: +/-11.2%

---

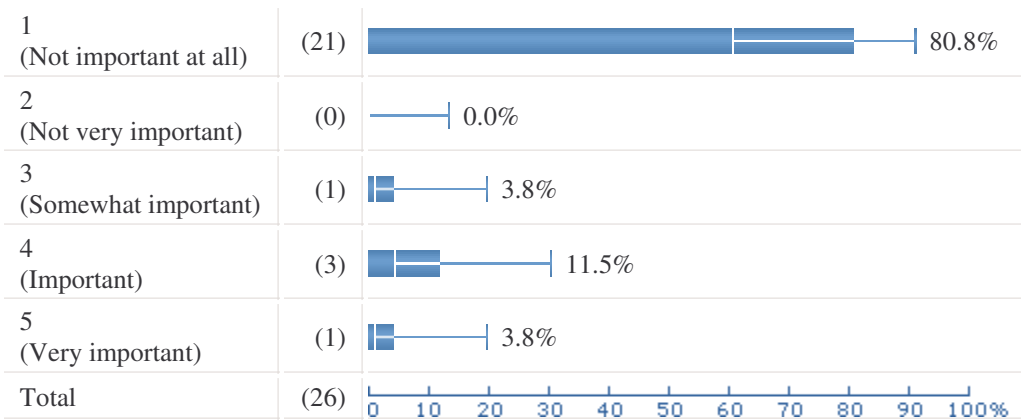
41h) h) Concern over losing intellectual property

1 (Not important at all)	(34)		45.9%
2 (Not very important)	(12)		16.2%
3 (Somewhat important)	(12)		16.2%
4 (Important)	(11)		14.9%
5 (Very important)	(5)		6.8%
Total	(74)		

Confidence: +/-11.2%

---

41i) i) Other



Confidence: +/-15.2%

An answer to this question is not required and 48 of 74 respondents chose not to answer.

---

42) If Other, please specify any other factors that have prevented you from making your artifacts available for reuse:

*Answers not displayed.*

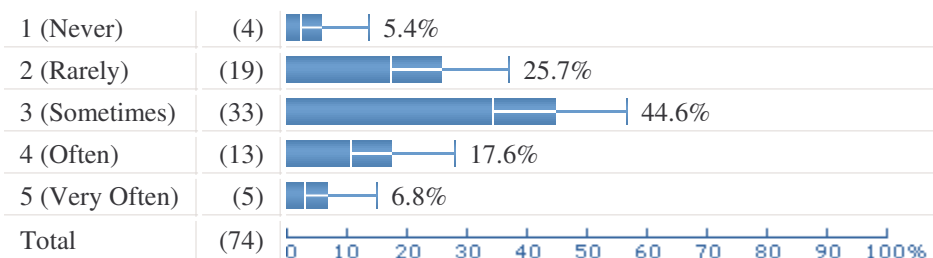
An answer to this question is not required and 70 of 74 respondents chose not to answer.

---

## xxvi) Reusability

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43) To your knowledge, how often are the software development artifacts produced by your project reused by others?



Confidence: +/-11.2%

---

44) The Software Reuse Working Group is very interested in identifying artifacts that have already been

successfully reused within the Earth science community. Please help us by listing a few of the reusable artifacts that you provided over the last five years

44a) Name of Artifact:

Answers not displayed.

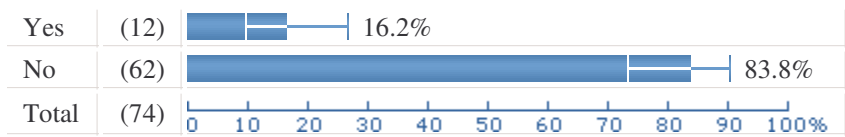
An answer to this question is not required and 21 of 74 respondents chose not to answer.

44b) Reference or URL of Artifact:

Answers not displayed.

An answer to this question is not required and 37 of 74 respondents chose not to answer.

45) Another Artifact?



Confidence: +/-8.5%

xxvii) **Reusability**

This question is asked if the answer to question 45 is *Yes*.

46) **Any information about this artifact will be appreciated.**

**This question is asked if the answer to question 45 is *Yes*.**

46a) Name of Artifact:

Answers not displayed.

This question is asked if the answer to question 45 is *Yes*.  
An answer to this question is not required and 0 of 12 respondents chose not to answer.

46b) Reference or URL of Artifact:

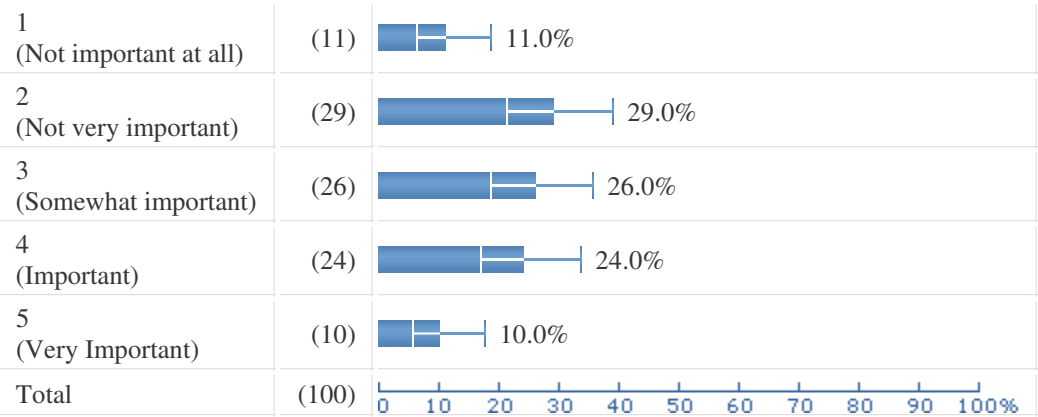
*Answers not displayed.*

This question is asked if the answer to question 45 is *Yes*.  
An answer to this question is not required and 0 of 12 respondents chose not to answer.

xxviii)**Community Needs**

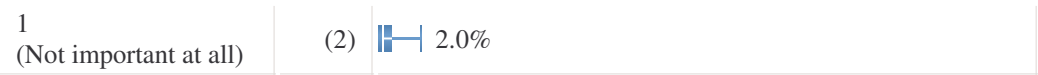
47) **In your opinion, how important would the following factors be in helping increase the level of reuse within Earth science community?**

47a) a) Standardized license agreement for the Earth science community

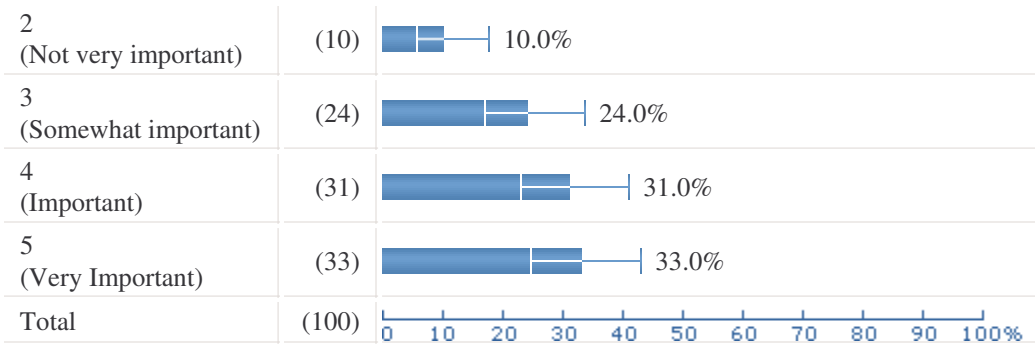


Confidence: +/-8.8%

47b) b) Use of open source licensing



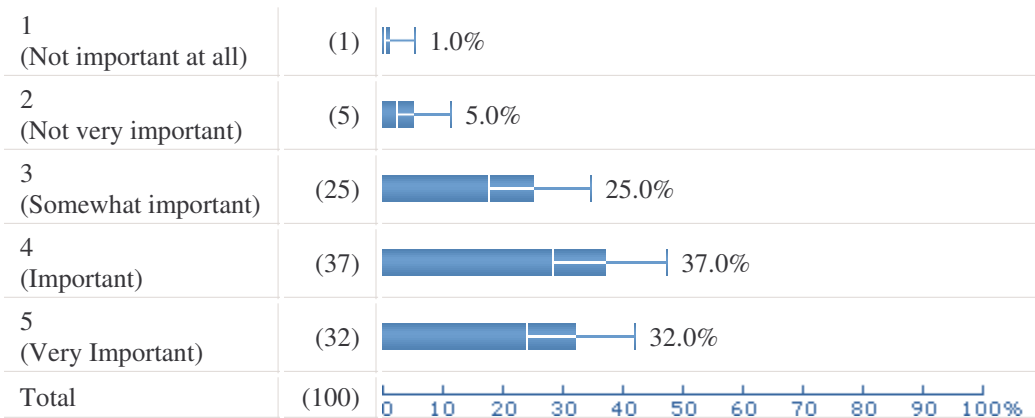




Confidence:  $\pm 9.2\%$

---

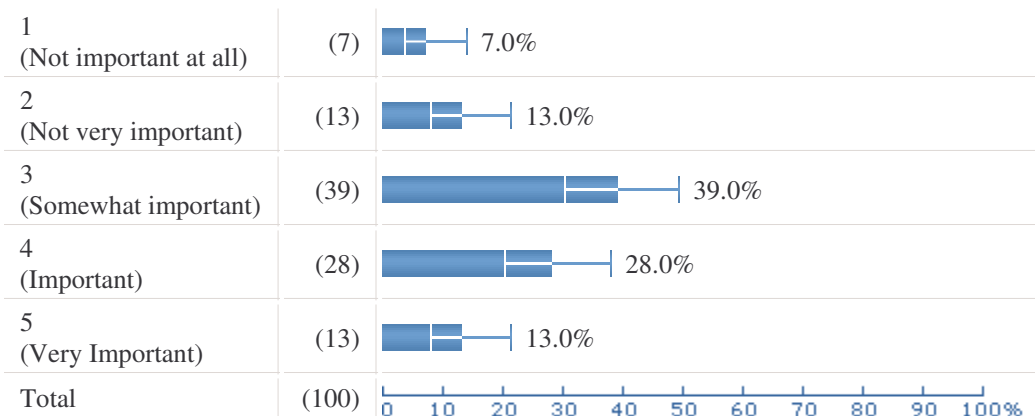
47c) c) An Earth science catalog/repository for reusable artifacts



Confidence:  $\pm 9.4\%$

---

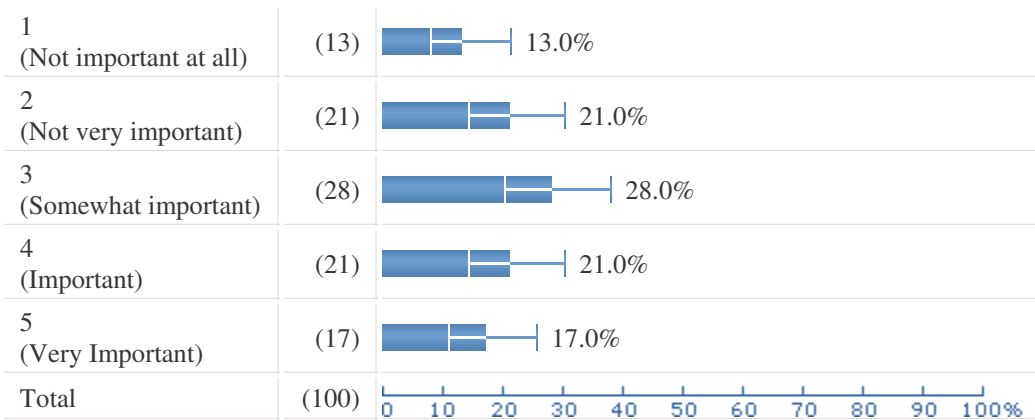
47d) d) Standardized support policy for reused software



Confidence:  $\pm 9.5\%$

---

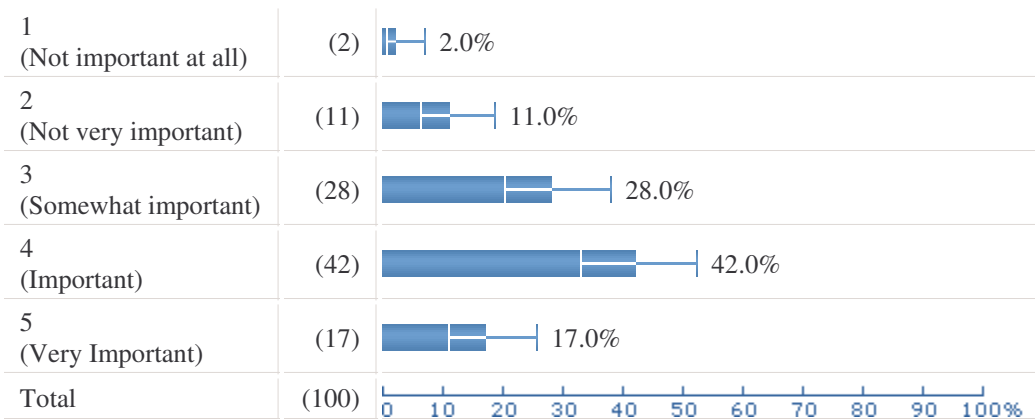
47e) e) Changes to NASA external release policy



Confidence: +/-8.8%

---

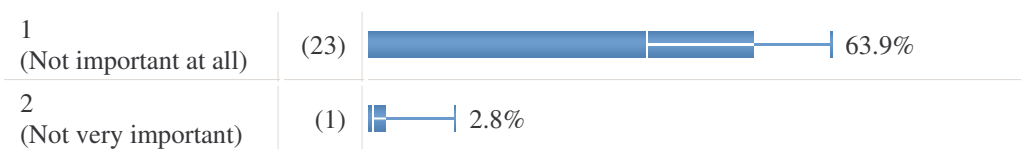
47f) f) Education/guidance on reuse

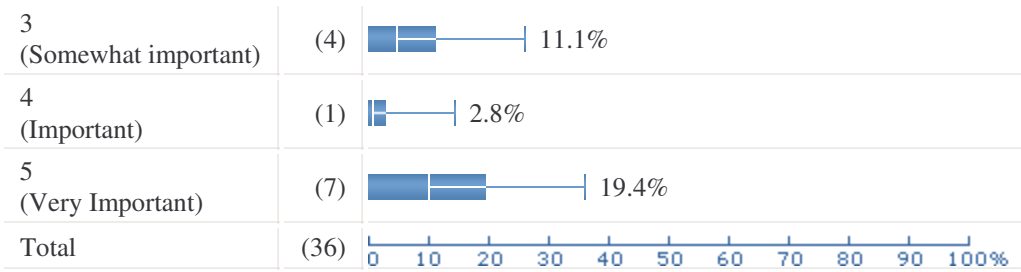


Confidence: +/-9.6%

---

47g) g) Other





Confidence: +/-15.3%

An answer to this question is not required and 64 of 100 respondents chose not to answer.

---

48) If Other, please specify what other factors you think are important in helping increase the level of reuse within the Earth science community:

*Answers not displayed.*

An answer to this question is not required and 87 of 100 respondents chose not to answer.

---

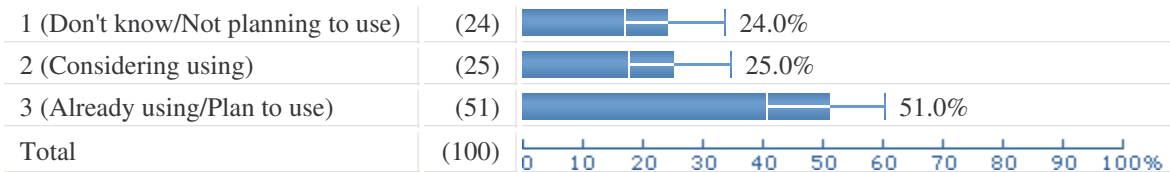
## xxix) Community Needs

---

49) Which of the following are you considering as part of your future software development efforts?

---

49a) a) Web services

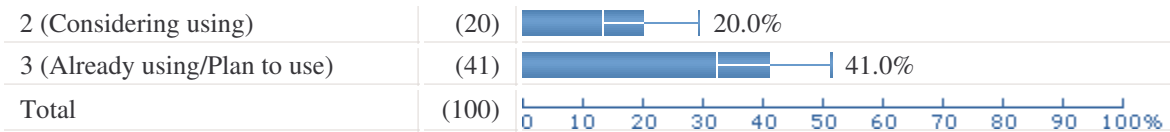


Confidence: +/-9.7%

---

49b) b) Component-based architectures

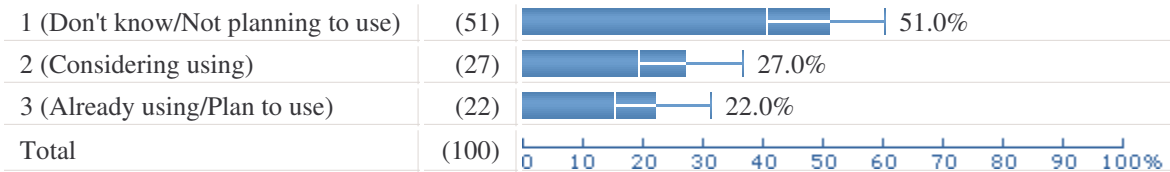




Confidence: +/-9.6%

---

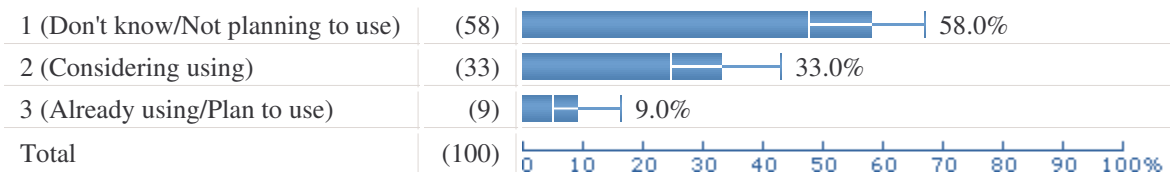
49c) c) Commercial components



Confidence: +/-9.7%

---

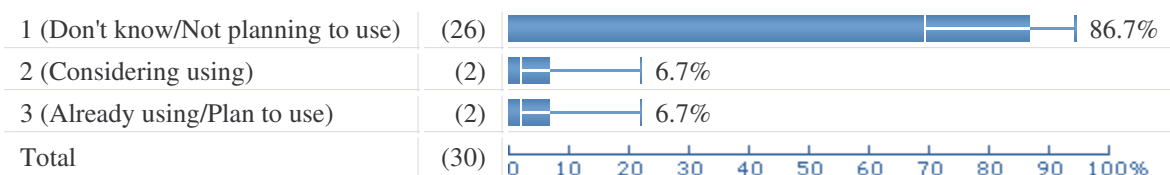
49d) d) Grid services



Confidence: +/-9.6%

---

49e) g) Other



Confidence: +/-12.5%

An answer to this question is not required and 70 of 100 respondents chose not to answer.

---

50) If Other, please specify what other alternative approaches/technologies you are considering to use in your future

software development efforts:

*Answers not displayed.*

An answer to this question is not required and 97 of 100 respondents chose not to answer.

---

51) **Which reusable artifacts would you use if those were made available? (feel free to specify specific artifacts that you would like to reuse, or types of artifacts you think may be useful for reuse).**

*Answers not displayed.*

An answer to this question is not required and 75 of 100 respondents chose not to answer.

---

52) **Thank you for your time. Please provide your name and contact information if you would like to be notified of the results of this survey and/or you would like to be informed of the future activities of the Earth Science Data Systems Software Reuse Working Group. Your name and contact information will not be shared with or distributed to any other entities.**

---

52a) Name (Optional):

*Answers not displayed.*

An answer to this question is not required and 50 of 100 respondents chose not to answer.

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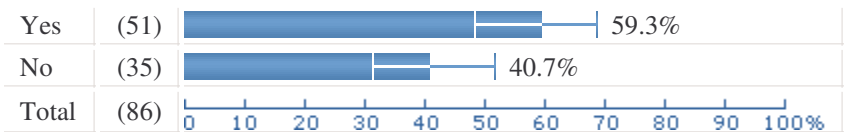
52b) Email (Optional):

*Answers not displayed.*

An answer to this question is not required and 47 of 100 respondents chose not to answer.

---

53) **May our researcher contact you if we need to clarify any of your responses?**



Confidence: +/-10.3%

An answer to this question is not required and 14 of 100 respondents chose not to answer.

Answers to this question are correlated with how respondents answered the following questions:

**Correlation Question**

-0.31 Q6) Over the last five years, have you reused software development artifacts developed outside of ....

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xxx) Your participation in this questionnaire is appreciated as it will enable the Working Group to better assess the reuse needs of the community and to propose solutions that can best fit those needs. Information collected in this questionnaire will not be used for any other purpose and will not be distributed to other entities without prior approval of the respondents. Results will be published in aggregate form only at <http://softwarereuse.gsfc.nasa.gov> .

We would truly appreciate it if you can forward the [URL of this survey](#) to other members of your organization who are involved in system architecture and/or influence decisions on selection of system components.

---

54) Feel free to use the space below to provide us with any information that you think is relevant to the Software Reuse Working Group goals, but was not covered in the survey questions.

*Answers not displayed.*

An answer to this question is not required and 82 of 100 respondents chose not to answer.

---

# Questionnaire

## Earth Science Software Reuse Questionnaire

This software reuse questionnaire is being conducted by the NASA Earth Science Data Systems Software Reuse Working Group to (1) learn about the Earth science community's needs for reusable software components (and other software development artifacts), (2) identify software artifacts that are already being reused within the community, and (3) identify existing patterns of software reuse.

Your participation in this survey is appreciated as it will help us to better understand the reuse needs of the Earth science community and to propose solutions that can best fit those needs. Such solutions will enable members of the community to more easily share, publish and locate reusable components of interest. By facilitating reuse within the Earth science community, the working group is seeking to help you reduce system development costs, gain greater visibility for your work within the community, and more efficiently share resources across projects.

On average, the questionnaire takes about 20 minutes to complete. In addition to submitting your own response, it would be valuable to the reuse working group if you can also forward the questionnaire to other members of your development team who are involved in system architecture and/or influence decisions on selection of system components.

The information collected here will only be used by the reuse working group for the purposes described above. Individual responses will not be distributed to other entities without prior approval from respondents. Results will only be published in aggregate form and will be made available at <http://softwarereuse.nasa.gov/>

The NASA Earth Science Data Systems Software Reuse Working Group is chartered to address technical issues required to enable and facilitate reuse of software assets within the Earth science community. The working group is comprised of part time support staff from NASA, Earth science mission projects, Earth science data providers and university researchers. More information about the activities of the working group can be found at <http://softwarereuse.nasa.gov/>. You can subscribe to our mailing list at [here](#).

## Background Information

1) **Which of the following best describes your main role in your project/software development process? (Select one)**

- ☐ Principal Investigator
- ☐ Scientist
- ☐ Technical/Project Manager
- ☐ System Architect/Designer/Engineer
- ☐ Software Engineer/Developer
- ☐ Other

If Other, please specify:

2) **Which category best describes the type of your organization? (Select one)**

- ☐ NASA
- ☐ Other Government Agency

- ☐ University/Academia
- ☐ Commercial Organization
- ☐ Other

If Other or Other Government Agency, please specify:

3) **Which Operating System(s) do you currently use or plan to use in the future for your system development activities? (check all appropriate boxes)**

- ☐ Unix
- ☐ Windows
- ☐ Macintosh
- ☐ Linux
- ☐ IBM Mainframes (e.g. MVS, z/OS)
- ☐ Other

If Other, please specify:

4) **Which programming language(s) do you currently use or plan to use in the future for your system development activities? (check all appropriate boxes)**

- ☐ C
- ☐ C++
- ☐ C#
- ☐ Java
- ☐ Perl
- ☐ Pascal
- ☐ Python
- ☐ Fortran
- ☐ Basic/Visual Basic
- ☐ Web development languages (PHP, JSP, etc.)
- ☐ Other

If Other, please specify:

5) Is your organization involved in activities that involve using either of the following:

	Not involved / Don't know	Considering it	Currently involved / Plan to start in the near future
Federal Enterprise Architecture	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CMMI	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Recent Reuse Experiences

**Definition of Reuse:** Within the context of this survey, reuse is defined as the process of creating systems using software development artifacts from existing systems, rather than building everything from scratch. Most reuse involves software source code but other types of software development artifacts (such as design patterns, algorithms, and executable components) can also be reused.

6) **Over the last five years, have you reused software development artifacts developed outside of your project or group?**



☐ Yes

☐ No

Go to question viii if question 6 is Yes

Go to question vi if question 6 is No

### Recent Reuse Experiences

7) **How important were the following factors in preventing you from reusing software development artifacts developed outside of your group?**

	1 (Not important at all)	2 (Not very important)	3 (Somewhat important)	4 (Important)	5 (Very important)
a) I didn't know where to look for reusable artifacts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) I didn't know that suitable reusable artifacts existed at the time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) I couldn't find anything that is compatible with my system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) Available artifacts were too complex or difficult to adapt to my needs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) Available artifacts were difficult to understand or poorly documented	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f) None of the available artifacts matched my requirements	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g) It was hard to overcome licensing restrictions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h) I needed the source code and it wasn't available	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i) I preferred to have the development take place within my project or wanted the experience of developing the needed capability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j) I didn't like how the other software was designed/implemented	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k) Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8) If Other, please specify what prevented you from reusing software development artifacts developed outside of your group:

Go to question xix if question 6 is No

### Recent Reuse Experiences

9) **Over the last five years, how often have you (or your project) reused the following types of software development artifacts?**

	1 (Never)	2 (Rarely)	3 (Sometimes)	4 (Often)	5 (Very Often)
a) Algorithms, Techniques	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) Designs, Architectures	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) Source code, Scripts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

d) Executables, Binaries	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- 10) If Other, please specify what other types of software development artifacts you have reused in the last five years:

- 11) **Over the last five years, how often have you (or your project) reused the following types of software?**

	1 (Never)	2 (Rarely)	3 (Sometimes)	4 (Often)	5 (Very Often)
a) Complete systems or applications	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) Subsystems or components	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) Code libraries	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) Code fragments	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- 12) If Other, please specify what other types of software you have reused in the last five years:

### Recent Reuse Experiences

- 13) **In your most recent software development experience, approximately what percentage of functionality was provided by each of the following (this is for your system only and excludes systems or services that your system interacts with)?**

	None	<5%	5-15%	15-50%	>50%
a) Existing software in the baseline system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) Newly written custom software	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) Software reused from another part of your organization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) Software reused from another organization in the Earth science community	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) Software reused from outside the Earth science community	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f) Commercial components	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g) Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- 14) If Other, please specify the other sources of software that you've used in your most recent software development project:

- 15) **If you've indicated that you've reused software from outside of your project group, how important were the following factors in your decision to consider reuse?**

	1 (Not important at all)	2 (Not very important)	3 (Somewhat important)	4 (Important)	5 (Very important)
a) Saving money	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) Saving time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) Ensuring reliability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

d) Not having the needed expertise in my organization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- 16) If Other, please specify how you provided the specified percentage of functionality in your most recent software development project:

### Recent Reuse Experiences

- 17) **For any of the newly written software, was there software from another source that might have provided \*any\* of the capabilities needed? If so, how important were the following factors in preventing you from reusing that software?**

	1 (Not important at all)	2 (Not very important)	3 (Somewhat important)	4 (Important)	5 (Very important)
a) I didn't know other software existed at the time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) Other software wasn't compatible with my system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) Other software didn't exactly match my requirements	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) Other software was difficult to understand or poorly documented	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) Other software was too complex or difficult to adapt to my needs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f) It was hard to overcome licensing restrictions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g) I needed the source code and it wasn't available	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h) I preferred to have the development take place within my project or wanted the experience of developing the needed capability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i) I didn't like how the other software was designed/implemented	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j) Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- 18) If Other, please specify what other factors prevented you from reusing existing software:

### Recent Reuse Experiences

- 19) **The Software Reuse Working Group is very interested in identifying some of the artifacts that have been successfully reused by the community. Please help us by listing a few of the artifacts that you have reused over the last five years.**

Name of Artifact:

Source Organization of Artifact:

Reference or URL of Artifact:

- 20) Another Artifact?

☐ Yes

☐ No

### Recent Reuse Experiences

- 21) **Any information about this artifact will be appreciated.**

Name of Artifact:

Source Organization of Artifact:

Reference or URL of Artifact:

- 22) Another Artifact?

☐ Yes

☐ No

### Recent Reuse Experiences

- 23) **Any information about this artifact will be appreciated.**

Name of Artifact:

Source Organization of Artifact:

Reference or URL of Artifact:

- 24) Another Artifact?

☐ Yes

☐ No

### Recent Reuse Experiences

- 25) **Any information about this artifact will be appreciated.**

Name of Artifact:

Source Organization of Artifact:

Reference or URL of Artifact:

- 26) Another Artifact?

☐ Yes

☐ No

### Recent Reuse Experiences

27) **Any information about this artifact will be appreciated.**

Name of Artifact:

Source Organization of Artifact:

Reference or URL of Artifact:

**Recent Reuse Experiences**

28) **How effective were the following in helping you locate and acquire software development artifacts?**

	1 (Not important at all)	2 (Not very important)	3 (Somewhat important)	4 (Important)	5 (Very important)
a) Personal knowledge from past projects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) Word of mouth/networking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) Google search or similar	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) Serendipity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) Reuse catalog or repository	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

29) Please list the catalogs or repositories you have used:

**Recent Reuse Experiences**

30) **When evaluating software development artifacts for reuse, how important are the following factors in influencing your decision to reuse an artifact?**

	1 (Not important at all)	2 (Not very important)	3 (Somewhat important)	4 (Important)	5 (Very important)
a) Knowledge of author	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) Testing/certification	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) Recommendation from colleague	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) Standards compliance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) Availability of source code	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f) Quality of documentation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g) Availability of support/maintenance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h) Low dependency on other artifacts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i) Ease of adaptation/integration	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j) Cost of creating/acquiring alternative	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k) Complexity of functionality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l) Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

31) If other, please specify any other factors that have influenced your decision to use an artifact in the past:

### Recent Reuse Experiences

32) For software development artifacts that you've reused in the last five years, how often have you

	1 (Never)	2 (Rarely)	3 (Sometimes)	4 (Often)	5 (Very Often)
a) Modified the artifacts?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) Communicated the changes back to the original developer(s) of those artifacts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

33) Now thinking about licensing for reuse: for software development artifacts that you've reused in the last five years, how often have you

	1 (Never)	2 (Rarely)	3 (Sometimes)	4 (Often)	5 (Very Often)
a) Used open source software?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) Used a shareware/public domain software?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) Used a formal license agreement with the artifact developer?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) Used a semi-formal agreement (e.g. Memorandum of Understanding) with the artifact developer?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) Reused the artifacts without a formal license?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### Reusability

**Definition of Reusability:** Reusability is the ability of a software development artifact to be reused, in whole or in part, in new systems.

34) Over the last five years, have you made any of your software development artifacts available for people outside of your project or group?

- ☐ Yes  
☐ No

Go to question xxii if question 34 is No

Go to question xxiv if question 34 is Yes

### Reusability

35) How important were the following factors in preventing you from making your software development artifacts available for reuse?

	1 (Not important at all)	2 (Not very important)	3 (Somewhat important)	4 (Important)	5 (Very important)
a) Not knowing how	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

b) Cost of developing for reuse	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) Not knowing if it will be useful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) Your organization's software release policy limitations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) Support and maintenance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f) No standard way for distribution	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g) Concern over losing competitive advantage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h) Concern over losing intellectual property	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i) Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- 36) If Other, please specify what prevented you from making your software development artifacts available for reuse outside of your group:

Go to question xxviii if question 34 is No

### Reusability

- 37) **How often have you built the following types of software development artifacts in a way that they can be more readily reused outside of your project?**

	1 (Never)	2 (Rarely)	3 (Sometimes)	4 (Often)	5 (Very Often)
a) Algorithms, Techniques	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) Designs, Architectures	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) Source code, Scripts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) Executables, Binaries	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- 38) If Other, please specify what other types of software development artifacts you have built in a way that they can be readily reused outside of your project:

- 39) **How often have you developed the following types of software in a way that they can be more readily reused outside of your project?**

	1 (Never)	2 (Rarely)	3 (Sometimes)	4 (Often)	5 (Very Often)
a) Complete solutions or applications	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) Subsystems or components	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) Code libraries	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) Code fragments	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

e) Other



- 40) If Other, please specify what other types of software you have developed in a way that they can be readily reused outside of your project:

### Reusability

- 41) **How important were the following factors in preventing you from making your artifacts available for reuse?**

	1 (Not important at all)	2 (Not very important)	3 (Somewhat important)	4 (Important)	5 (Very important)
a) Not knowing how	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) Cost of developing for reuse	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) Not knowing if it will be useful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) Your organization's software release policy limitations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) Support and maintenance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f) No standard way for distribution	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g) Concern over losing competitive advantage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h) Concern over losing intellectual property	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i) Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- 42) If Other, please specify any other factors that have prevented you from making your artifacts available for reuse:

### Reusability

- 43) **To your knowledge, how often are the software development artifacts produced by your project reused by others?**

☐ 1 (Never)   ☐ 2 (Rarely)   ☐ 3 (Sometimes)   ☐ 4 (Often)   ☐ 5 (Very Often)

- 44) **The Software Reuse Working Group is very interested in identifying artifacts that have already been successfully reused within the Earth science community. Please help us by listing a few of the reusable artifacts that you provided over the last five years**

Name of Artifact:

Reference or URL of Artifact:



45) Another Artifact?

- ☐ Yes  
☐ No

### Reusability

46) **Any information about this artifact will be appreciated.**

Name of Artifact:

Reference or URL of Artifact:

### Community Needs

47) **In your opinion, how important would the following factors be in helping increase the level of reuse within Earth science community?**

	1 (Not important at all)	2 (Not very important)	3 (Somewhat important)	4 (Important)	5 (Very Important)
a) Standardized license agreement for the Earth science community	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) Use of open source licensing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) An Earth science catalog/repository for reusable artifacts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) Standardized support policy for reused software	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) Changes to NASA external release policy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f) Education/guidance on reuse	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g) Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

48) If Other, please specify what other factors you think are important in helping increase the level of reuse within the Earth science community:

### Community Needs

49) **Which of the following are you considering as part of your future software development efforts?**

	1 (Don't know/Not planning to use)	2 (Considering using)	3 (Already using/Plan to use)
a) Web services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) Component-based architectures	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) Commercial components	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) Grid services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g) Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- 50) If Other, please specify what other alternative approaches/technologies you are considering to use in your future software development efforts:

- 51) **Which reusable artifacts would you use if those were made available? (feel free to specify specific artifacts that you would like to reuse, or types of artifacts you think may be useful for reuse).**

- 52) **Thank you for your time. Please provide your name and contact information if you would like to be notified of the results of this survey and/or you would like to be informed of the future activities of the Earth Science Data Systems Software Reuse Working Group. Your name and contact information will not be shared with or distributed to any other entities.**

Name (Optional):

Email (Optional):

- 53) May our researcher contact you if we need to clarify any of your responses?

☐ Yes

☐ No

**Your participation in this questionnaire is appreciated as it will enable the Working Group to better assess the reuse needs of the community and to propose solutions that can best fit those needs. Information collected in this questionnaire will not be used for any other purpose and will not be distributed to other entities without prior approval of the respondents. Results will be published in aggregate form only at <http://softwarereuse.gsfc.nasa.gov> .**

**We would truly appreciate it if you can forward the [URL of this survey](#) to other members of your organization who are involved in system architecture and/or influence decisions on selection of system components.**

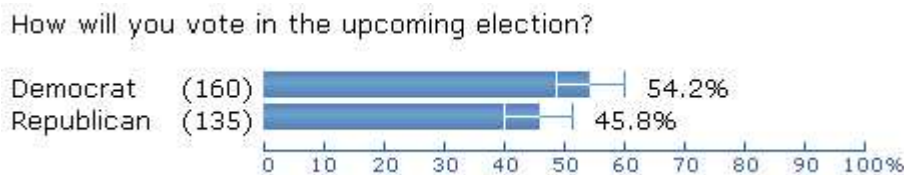
- 54) **Feel free to use the space below to provide us with any information that you think is relevant to the Software Reuse Working Group goals, but was not covered in the survey questions.**

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# Notes

## Bar Graph Confidence Intervals:

The bar graphs presented in the Results Analysis section include 95% confidence intervals to illustrate the degree of precision available in your results. For example, in the following graph 54.2% (160/295) of the respondents indicated they will vote Democrat vs. 45.8% (135/295) Republican.



However, because the survey is based on the results of only 295 respondents, the actual percent of people who will vote Democrat could be somewhat higher or lower than 54.2%. Confidence intervals tell you how much higher or lower the percent could be. The I-bar show and the tip of each bar illustrates the spread between the lowest and highest value you are likely to see if you were to survey the entire population. In the example above, you can be 95% certain that the actual percent of people who will vote Democrat will be between 48% and 60%. Furthermore, somewhere between 40% and 52% of people will vote Republican. As you increase the number of respondents the range of uncertainty shrinks.

## Confidence:

Each bar graph group is followed by the text "Confidence:" and a percentage. This number is the largest confidence interval found on any of the bars in the group and can be used as a summary measure of precision. The more precise, non-symmetrical confidence intervals are illustrated separately on each bar.

## Average Score:

Some bar graph groups are followed by the text "Average Score:" and a number that represents the weighted average of all options chosen by the respondents. For example, if you asked respondents to rate their satisfaction on a scale including *Very satisfied*, *Satisfied*, *Neutral*, *Dissatisfied*, and *Very dissatisfied* and half responded *Very satisfied* and half responded *Satisfied*, the average score would be 1.5--half chose the first option (score=1) and half chose the second option (score=2), so the average score is 1.5.

## Correlation:

The answers to two questions are correlated when they tend to move together. For example, if you ask respondents to rate their overall satisfaction with your company and also ask if they are likely to

purchase from your company again, the answers to these questions will probably show a strong correlation. That is, when satisfaction is high, the likelihood of repeat purchase is high. This is a positive correlation. Some question pairs have negative correlation. For example, the time a person spends on hold when calling for support usually has a negative correlation with overall satisfaction. Correlation is presented as a number from -1 to 1 where -1 is perfect negative correlation, 0 is no correlation, and 1 is perfect positive correlation.

When a statistically significant correlation between the answers of any two questions is found the report will include a note highlighting the correlation. This information can be used to gain insight into what factors drive key measures such as overall satisfaction.